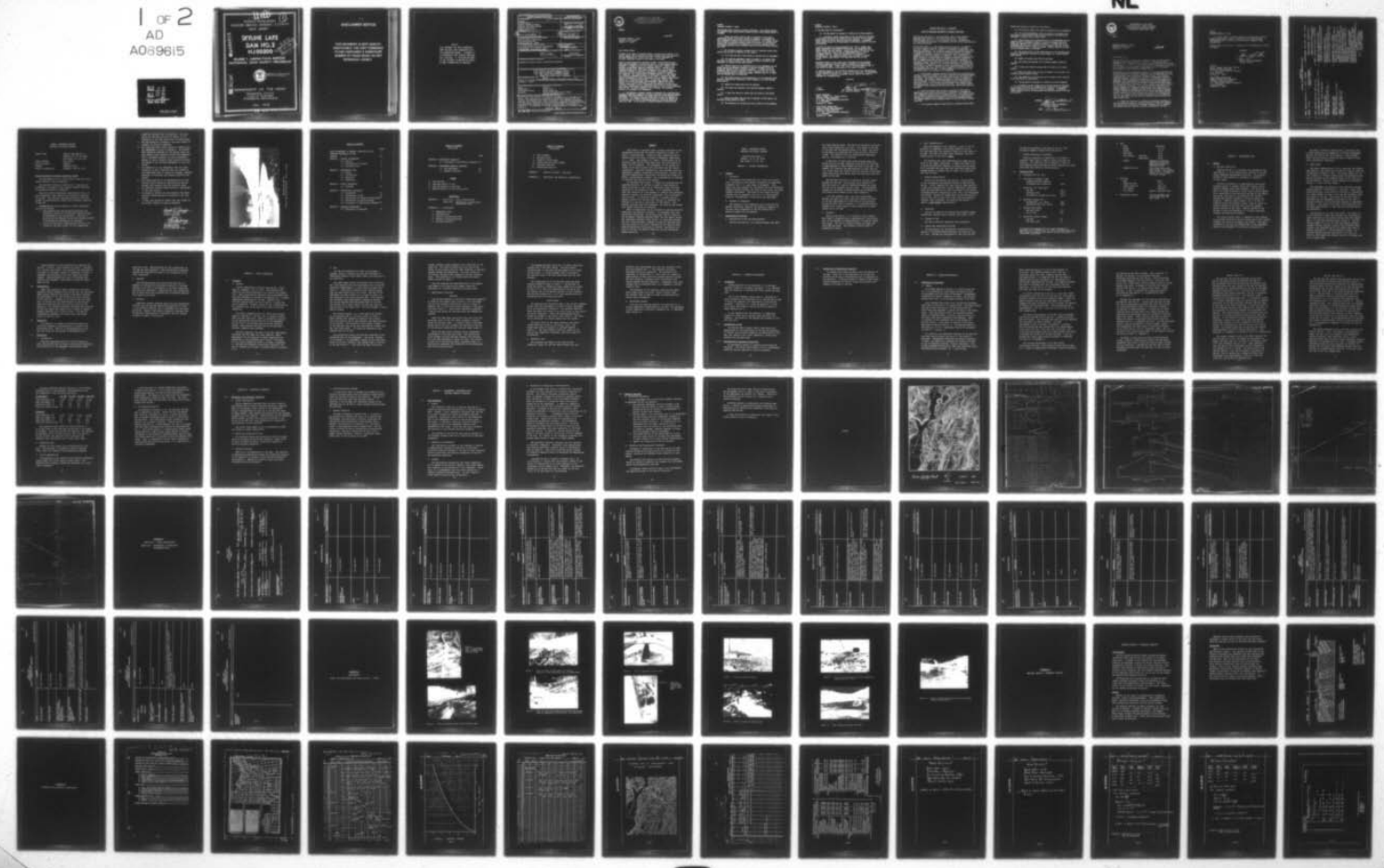
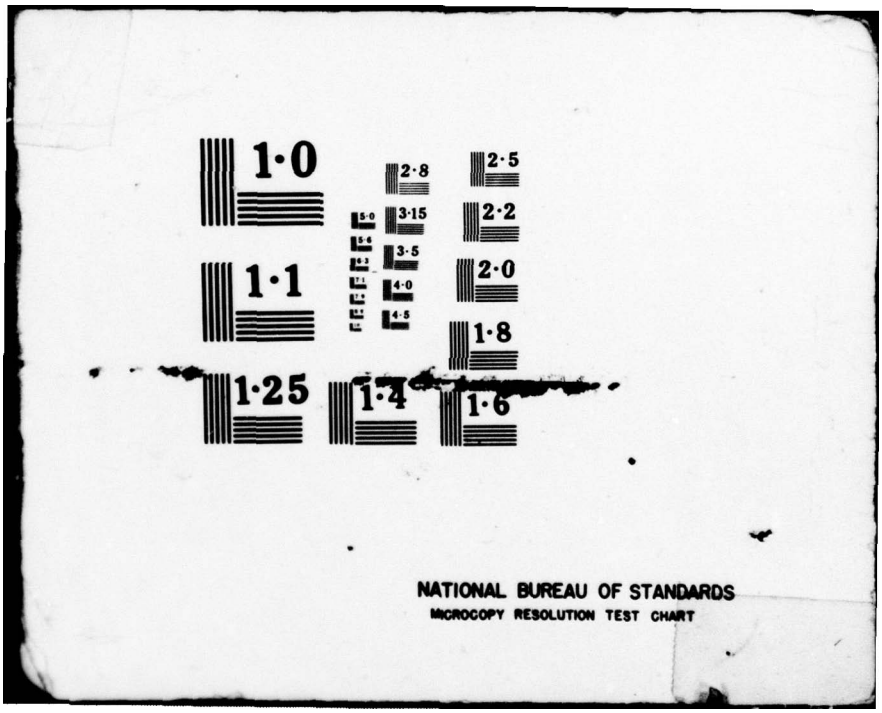
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NATIONAL DAM SAFETY PROGRAM. SKYLINE LAKE DAM NUMBER 2 (NJ00200--ETC(U)
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MICROCOPY RESOLUTION TEST CHART

LEVEL

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SHEPARD BROOK, PASSAIC COUNTY
NEW JERSEY

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SKYLINE LAKE
DAM NO. 2
NJ00200

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PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

May, 1979

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: NJ00200

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle): Phase I Inspection Report
National Dam Safety Program
Skyline Lake Dam No. 2
Passaic County, N.J.

5. TYPE OF REPORT & PERIOD COVERED: (9) FINAL Rept.,

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s): (10) Robert J. Jenny, ~~P.E.~~

8. CONTRACT OR GRANT NUMBER(s): (15) DACW61-78-C-0124

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Jenny-Leedshill Engineering
318 South Orange Ave.
South Orange, N.J. 07079
410 891

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS
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Custom House, 2d & Chestnut Streets
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12. REPORT DATE: (11) May ~~1~~ 1979

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(6) National Dam Safety Program. Skyline Lake Dam Number 2 (NJ00200), Passaic River Basin, Shepard Brook, Passaic County, New Jersey. Phase I Inspection Report.

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams
Embankments
Structural Analysis
Spillways
Erosion
Bridge Piers
Visual Inspection
National Dam Inspection Act Report
Skyline Lake Dam #2, N.J.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

410 891

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE--2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

24 MAY 1979

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Skyline Lake Dam No. 2 in Passaic County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Skyline Lake Dam No. 2 a high hazard potential structure, is judged to be in fair overall condition. However, the spillway is considered seriously inadequate since 11 percent of the Probable Maximum Flood (PMF) would overtop the dam. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan

and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to determine the dam's embankment condition and structural stability. This should include test borings to determine material properties relative to stability and seepage and installation of piezometers to facilitate seepage studies. Any remedial measures found necessary should be initiated within calendar year 1980.

c. The following remedial actions should be completed within three months from the date of approval of this report:

(1) All brush and small trees should be removed from the embankment.

(2) The upstream embankment should be graded to the design slope and riprap or other suitable slope protection should be placed on the embankment to prevent further wave erosion.

(3) Erosion scars on the downstream face of the embankment and the eroded section of embankment adjacent to the west wingwall should be filled and compacted with a suitable earthfill. If inspection of the embankment when the upper reservoir is full indicates that the erosion on the downstream face is caused by seepage, remedial measures to eliminate the seepage should be performed.

(4) The eroded portion of the downstream toe of the spillway apron should be replaced and resurfaced in such a manner as to avoid further deterioration.

(5) Remove the bridge piers from the spillway.

(6) The cracks and spalling in the spillway wingwall should be repaired.

(7) A trash rack should be placed over the intake to the outlet conduit.

d. Within six months from the date of approval of this report, the following actions should be taken:

(1) The seismicity at the dam site and its effect on the stability

of the dam should be investigated.

(2) The dam should be surveyed to confirm its as-built geometry.

e. A program of annual inspections of the dam should be initiated by the owners, utilizing the standard visual checklist in this report. Timely corrective action should be taken as necessary. A permanent record should be kept of all maintenance and operating events of the dam and reservoir.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Robert A. Roe of the Eighth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

Joel Kellebrew LTC

JAMES G. TON
Colonel, Corps of Engineers
for District Engineer

1 Incl
As stated

Copies furnished:
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Division of Water Resources
N. J. Dept. of Environmental Protection
P. O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
N. J. Dept. of Environmental Protection
P. O. Box CN029
Trenton, NJ 08625

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SKYLINE LAKE DAM NO. 2 (NJ00200)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 1 and 20 December 1978 by Jenny-Leedshill Engineers under contract to the State of New Jersey. The State, under agreement with the U. S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Skyline Lake Dam No. 2 a high hazard potential structure, is judged to be in fair overall condition. However, the spillway is considered seriously inadequate since 11 percent of the Probable Maximum Flood (PMF) would overtop the dam. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to determine the dam's embankment condition and structural stability. This should include test borings to determine material properties relative to stability and seepage and installation of piezometers to facilitate seepage studies. Any remedial measures found necessary should be initiated within calendar year 1980.

c. The following remedial actions should be completed within three

months from the date of approval of this report:

(1) All brush and small trees should be removed from the embankment.

(2) The upstream embankment should be graded to the design slope and riprap or other suitable slope protection should be placed on the embankment to prevent further wave erosion.

(3) Erosion scars on the downstream face of the embankment and the eroded section of embankment adjacent to the west wingwall should be filled and compacted with a suitable earthfill. If inspection of the embankment when the upper reservoir is full indicates that the erosion on the downstream face is caused by seepage, remedial measures to eliminate the seepage should be performed.

(4) The eroded portion of the downstream toe of the spillway apron should be replaced and resurfaced in such a manner as to avoid further deterioration.

(5) Remove the bridge piers from the spillway.

(6) The cracks and spalling in the spillway wingwall should be repaired.

(7) A trash rack should be placed over the intake to the outlet conduit.

d. Within six months from the date of approval of this report, the following actions should be taken:

(1) The seismicity at the dam site and its effect on the stability of the dam should be investigated.

(2) The dam should be surveyed to confirm its as-built geometry.

e. A program of annual inspections of the dam should be initiated by the owners, utilizing the standard visual checklist in this report. Timely corrective action should be taken as necessary. A permanent record should be kept of all maintenance and operating events of the dam and reservoir.

APPROVED: Jack J Callahan LTC
JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 24 May 1979

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

17 MAY 1979

Dear Governor Byrne:

This is in reference to our ongoing National Program for Inspection of Non-Federal Dams with the State of New Jersey. Skyline Lake Dam No. 2 (Federal I.D. No. NJ00200), a high hazard potential structure has recently been inspected. The dam is owned by the Skyline Lake Property Owners Associat and is located on Shephard Brook approximately one mile northeast of the Borough of Wanaque-Midvale in Passaic County.

Using Corps of Engineers screening criteria, it has been determined that the dam's spillway is seriously inadequate since approximately 11 percent of the Probable Maximum Flood would overtop the dam. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise, or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard potential to loss of life downstream from the dam. As a result of this UNSAFE determination, it is recommended that the dam's owner take the following measures within 30 days of the date of this letter:

a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.

NAPEN-D
Honorable Brendan T. Byrne

b. In the interim, a detailed emergency operation plan and downstream warning system should be developed. Also, round-the-clock surveillance should be provided during periods of unusually heavy precipitation.

A final report on this Phase I Inspection will be forwarded to you within two months.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

Cy Furn:
Dirk C. Hofman, Actg Deputy Director
Division of Water Resources
N. J. Dept of Environmental Protection
P. O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
N. J. Dept of Environmental Protection
P. O. Box CN029
Trenton, NJ 08625

UNSAFE DAM
NATIONAL PROGRAM OF INSPECTION OF DAMS

a. **NAME:** Skyline Lake Dam No. 2 b. **ID NO.:** NJ00200

c. **LOCATION** State: New Jersey County: Passaic
River or Stream: Shephard Brook
Nearest D/S City or Town: Wanaque-Midvale

d. **HEIGHT:** 24 feet

e. **MAXIMUM IMPOUNDMENT CAPACITY:** 400 ac. ft.

f. **TYPE:** Earthfill with steel sheet pile core

g. **OWNER:** Skyline Lake Property Owners Assoc.

h. **DATE GOVERNOR NOTIFIED OF UNSAFE CONDITIONS:** 17 May 78

i. **CONDITION OF DAM RESULTING IN UNSAFE ASSESSMENT** Preliminary report calculations indicate 11% of PMF would overtop the dam.

l. **URGENCY CATEGORY:** UNSAFE, Non-Emergency

m. **EMERGENCY ACTIONS TAKEN:**
Gov. notified of this condition by District Engineer's letter of 17 May 78.

j. **DESCRIPTION OF DANGER INVOLVED:**
Overtopping and failure of the dam significantly increases hazard potential to loss of life and property downstream of dam.

n. **REMEDIAL ACTIONS TAKEN:**
N.J.D.E.P. will notify dam's owner upon receipt of our letter

k. **RECOMMENDATIONS GIVEN TO GOVERNOR:**
Within 30 days of date of District Engineer letter the owner do the following:
a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.
b. In the interim, a detailed emergency operation plan and downstream warning system should be developed. Also, around-the-clock surveillance should be provided during periods of unusually heavy precipitation.

o. **REMARKS:** Final report, to be issued within six weeks, will have WHITE cover.

for F J Braun
W. H. ZINK, Coordinator
Dam Inspection Program
U.S.A.E.D., Philadelphia

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Skyline Lake Dam No. 2 Federal I.D. No. NJ 00200 New Jersey I.D. No. 398
State Located:	New Jersey
County Located:	Passaic
Stream:	Shephard Brook
Dates of Inspection:	December 1 and 20, 1978

Brief Assessment of General Condition of Dam

The dam appears to be in fair overall condition structurally based on visual inspection.

The spillway of Skyline Lake Dam No. 2 can pass approximately 10 percent of the Probable Maximum Flood and is considered seriously inadequate.

There are certain maintenance deficiencies which, if left unattended, could imperil the structural integrity of the dam. The available engineering data are not sufficient to quantitatively analyze the structural stability of the dam.

Recommendations and the urgency of their implementation are as follows:

1. More sophisticated and detailed hydrologic and hydraulic analyses of the spillway capacity should be performed as soon as possible. From this, a positive action program of corrective measures should be developed and implemented as necessary.
2. Field and laboratory investigations should be initiated in the near future, so that seepage and

stability analyses may be performed. The seismicity at the dam site and its effect on the stability of the dam should also be investigated.

3. The dam should be surveyed in the near future to confirm its as-built geometry.
4. All brush and small trees should be removed from the embankment as soon as possible. The embankment should be regraded to the design slope and any erosion scars should be filled and compacted with a suitable earthfill as soon as possible. Riprap or other suitable slope protection should be placed on the upstream embankment in the near future.
5. If inspection of the embankment when the upper reservoir is full indicates that the erosion on the downstream face is caused by seepage, remedial measures to eliminate the seepage should be performed.
6. The eroded portion of the downstream toe of the spillway apron should be repaired soon and the bridge piers removed from the spillway crest.
7. An effective warning system should be implemented in the near future.
8. A program to inspect the dam annually and after critical floods should be initiated in the near future.
9. A trash rack should be placed over the intake to the outlet conduit as soon as possible.

Frank L. Panuzio

Frank L. Panuzio, P.E.
Project Engineer

Robert J. Jenny
Project Director
N.J. License No. 9878



SKYLINE LAKE DAM #2

View of dam from downstream. (Dec. 1, 1978)

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APPENDIX D - Hydrologic and Hydraulic Computations

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Skyline Lake Dam No. 2
Federal I.D. No. NJ 00200
New Jersey I.D. No. 398

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The National Dam Inspection Act, Public Law 92-367, 1972, provides for the National Inventory and Inspection Program by the U. S. Army Corps of Engineers. This report has been prepared in accordance with this authority, through contract between the State of New Jersey and Jenny-Leedshill Engineers. The State of New Jersey has also entered into an agreement with the U. S. Army Engineer District, Philadelphia, to have this work performed.

b. Purpose of Inspection

The purpose of this inspection was to evaluate the general structural integrity and hydraulic adequacy of the dam, and to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Description of Dam and Appurtenances

Skyline Lake Dam No. 2 is located between the upper

and lower Skyline Lakes. The dam is an earthfill structure with a steel sheet pile core wall. The length of the dam is 230 feet and the maximum height is 24 feet. The crest of the dam is at elevation 284.3 feet and has a width of 8 feet. The slope of both the upstream and downstream face is 2 horizontal on 1 vertical.

A core wall of steel sheet piles extends along the center line of the dam, extending from the top of the dam to approximately 12 feet beneath the base of the dam. The remnant of a concrete cap approximately 30 feet long and 2 to 3 feet thick was found on top of a section of the steel sheet piles which were driven below the dam crest near the center of the dam.

The spillway structure is located on the left (east) abutment of the dam. The spillway crest length is 50 feet and there is 4 feet of freeboard between the crest and top of the concrete spillway walls. The downstream channel has an asphalt macadam surface and discharges at the normal water surface of the lower reservoir.

A 20-inch diameter cast iron outlet pipe passes between the upper and lower reservoirs beneath the base of the dam approximately 50 feet west of the spillway. The outlet pipe valve is housed in a reinforced concrete chamber with a steel manhole cover located at the downstream toe of the dam.

b. Location

Skyline Lake Dam No. 2 is located in north central New Jersey on Shephard Brook, approximately 1 mile northeast of the Borough of Wanaque-Midvale, in Passaic County, New Jersey. The dam is situated between the upper and lower Skyline Lakes. The regional vicinity plan is presented on Plate 1.

c. Size Classification

When the dredging of the reservoir, which is now in progress, is completed, the storage capacity will be 400 acre-feet when the reservoir stage is at the crest of the dam. The dam is 24 feet high, therefore, the size classification of the dam is small.

The criteria for size classification of dams are set forth in the Corps' Guidelines. A small size dam is one in which the reservoir capacity is greater than or equal to 50 acre-feet and less than 1000 acre feet, and/or the maximum height is greater than or equal to 25 feet and less than 40 feet.

d. Hazard Classification

Failure of the Skyline Lake Dam No. 2 would result in the overtopping and possible failure of Skyline Lake Dam No. 1 which impounds the lower Skyline Lake reservoir. A road and playground were visible immediately downstream from the lower dam and at least six houses in the Borough of Wanaque-Midvale (population 8,500) are in the downstream flood path. Failure or misoperation of the dam could result in the loss of more than a few lives and excessive economic loss; therefore, the Skyline Lake Dam No. 2 merits a high hazard classification.

e. Ownership

The dam is owned by the Skyline Lake Property Owners Association, Skyline Lake, Ringwood, New Jersey, 07456.

f. Purpose of Dam

The dam is used for aesthetics and recreation.

g. Design and Construction History

The application for construction of Skyline Lake Dam No. 2, including design drawings, was filed on June 29, 1945. The dam was constructed in 1945 and 1946 and

the dam was accepted by the State on May 20, 1947 following remedial construction during 1947.

h. Normal Operational Procedures

There is typically no regulation of the dam or reservoir other than to empty it every few years for cleaning. The reservoir can be emptied via the 20-inch diameter pipe providing, the lower reservoir is drawn down below the intake to the outlet pipe.

1.3 Pertinent Data

a. Drainage Area (sq. mi.)	2.8
b. Discharge at Damsite (cfs)	
. Ungated spillway capacity at maximum pool elevation	1040
c. Elevation (ft. above MSL)*	
. Top Dam	284.3
. Spillway crest	280.3
. Streambed at centerline of dam	260.3
d. Reservoir Length (ft.)	
. Maximum pool (El. 284.3)	3500
. Recreation pool (El. 280.3)	3400
e. Storage (acre-feet)	
. Spillway crest	330
. Top of dam	400
f. Reservoir Surface (acres)	
. Top dam	24
. Spillway crest	18

*A contour map prepared for the recent dredging of reservoir No. 2, dated Jan. 31, 1978, indicates that 158.3 feet should be added to the design drawing elevations to obtain MSL elevations.

g. Dam

. Type		Earthfill
. Length		230 ft.
. Height		24 ft.
. Top Width		8 ft.
. Side Slopes	- upstream	2H:1V
	- downstream	2H:1V
. Zoning		Impervious earthfill upstream of core and pervious earthfill on downstream side.
. Impervious Core		Steel sheet pile core wall driven 12 ft. below base of dam. Concrete cap poured on top of piles at center of dam.

h. Spillway

. Type	Chute
. Length of weir	50 ft.
. Crest elevation	280.3 ft.
. U/S Channel	Reservoir
. D/S Channel	Asphalt concrete chute

i. Regulating Outlets — 20-inch diameter cast iron outlet pipe and gate valve

SECTION 2: ENGINEERING DATA

2.1 Design

a. Geologic Conditions

Skyline Lake No. 2 is situated just upstream of Skyline Lake No. 1 in the north-central portion of the New Jersey Highlands physiographic province. The regional geology of this province is discussed in Appendix C to this report.

The dam is located in an approximately north-south oriented narrow "U" shaped valley with steeply rising bedrock surfaces above both abutments. The valley is part of a longer north-south linear feature which appears to be controlled by the structural geology of the region. The valley lies north of the Wisconsin Age terminal moraine and exhibits evidence of glacial plucking and scouring. Numerous large boulders, up to 10 feet in diameter litter the adjacent slopes, some the result of glacial deposition and some talus from the exposed bedrock farther up the slope. Bedrock exposed at the surface on both high abutments is a lightly weathered, slightly foliated granite gneiss.

The valley bottom itself is composed of what appears to be recent alluvium in the old stream course and a highly bouldery till up to the steeper rock slopes. Work being conducted in the area has exposed some of the embankment material which appears to be primarily reworked till.

The dam is located in Seismic Zone 1 indicating only a slight possibility of damage due to distant earthquakes. However, the dam is near the seismically active Ramapo Fault, and the valley in which the dam is located is possibly structurally controlled.

b. Design Data

The permit application No. 399 to construct the Skyline Lake Dam No. 2 was filed with the State on June 27, 1945 and was approved on August 2, 1945. The plans, dated July 10, 1945, consist of 3 sheets showing plans and sections of the dam and spillway and an isometric detail of the left wall of the spillway. Copies of these drawings are included as Plates 2, 3, and 4 of this report.

The embankment was designed to have upstream and downstream slopes of 2 horizontal on 1 vertical. Steel sheet piles were driven at the center of the dam to a penetration of 12 feet beneath the base of the dam and extending along the length of the dam. The section of the dam (Plate 4) indicates that the embankment downstream of the core is pervious earthfill and the material upstream is impervious earthfill. This section also shows riprap extending from the crest approximately 17 feet down the upstream face of the embankment.

The spillway is a 50 foot wide chute. The crest is a 2-foot wide and 6.5-foot high concrete wall extending between side walls of the spillway which retain the embankment at 4 feet above spillway crest (Plate 3). The discharge channel is a 40 to 50 foot long asphalt macadam pavement between concrete training walls extending downstream to the discharge end at the normal lake level of Skyline Lake Dam No. 1, about elevation 268 MSL. The spillway design flood was reported as 300 cfs/sq. mi. based on 125% Central New Jersey Curve for a drainage area of 2.8 square miles.

Specifications for the construction of Skyline Lake Dams No. 1 and No. 2 were prepared by Newell C. Harrison, P.E., Butler, New Jersey. The earthfill was specified to be placed in horizontal layers not exceeding 6 inches in thickness and thoroughly rolled and tamped with heavy rammers. Specifications were given for concrete preparation and placement, slope paving, riprap and steel sheet piling.

2.2 Construction

Eight dam inspection reports prepared by the State engineers between December 1945 and May 1947 are available. These reports describe the general constrcution progress and performance of the dam following the first filling of the reservoir. Leakage at the base of the left abutment of the spillway and deterioration of the spillway apron occurred soon after the initial filling of the reservoir. The leakage reportedly decreased with time and the spillway apron was covered with 3 inches of asphalt macadam compacted with a 20-ton roller. The dam was subsequently accepted by the Water Policy and Supply Council on May 20, 1947.

2.3 Operations

The reservoir is normally uncontrolled except for occasional drawdown in anticipation of a storm or for maintenance work. There is no instrumentation of the dam, and there are few records of maintenance work.

2.4 Evaluation

a. Availability

Available engineering data for the dam consist of plans and sections which include a qualitative description of the material in the embankment and specified steel

sheet pile size. Specifications for the construction of the dam are also available. Some construction inspection reports are available but there is no information on as-built conditions.

b. Adequacy

The available design and construction data are inadequate to evaluate the structural stability of the dam because of the lack of information on as-built conditions and materials properties. Specifications were qualitative and no field tests were performed and no detailed construction reports were filed.

c. Validity

Inspection reports prepared during the dam construction indicate that the dam was constructed generally as shown on the available drawings and in accordance with the specifications. However, the present inspection indicates that the spillway cross-section is horizontal and not concave as shown on Plate 3, Section A-A.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

Visual inspections of Skyline Lake Dam No. 2 were made on December 1 and 20, 1978. The reservoir was empty and was being excavated at the time of the inspection. Water entering the reservoir was being pumped over the right abutment of the dam into Reservoir No. 1 located immediately downstream of the dam. Reservoir No. 1 had been lowered below the toe of Dam No. 2 during the first inspection. Several inches of snow covered most of the upstream face of the dam at the time of the first inspection.

The visual inspections did not reveal any critical signs of distress in the dam, but, in general, maintenance has been deficient. There is evidence of erosion on the upstream and downstream face of the embankment and the toe of the spillway apron has been seriously eroded. Some cracking and spalling of the spillway's concrete wingwalls were observed.

Detailed inspection was made of the dam, appurtenant structures and the upper and lower reservoir areas. Descriptions of the findings of these inspections are summarized in the paragraphs which follow. The check list of visual inspection items is included in Appendix A. Geologic and foundation conditions observed at the time of inspection are noted in greater detail in Section 2.1-a.

b. Dam

The dam was inspected for signs of settlement, seepage, erosion, cracking and any other evidence of undesirable behavior which might affect the stability of the structure.

The steel sheet piling and concrete cap of the core wall were exposed along the longitudinal axis of the dam protruding approximately 6 inches above the earth fill (Photo 1). Some minor cracking of the concrete which caps the steel sheet piling was noted. The top of the embankment has been eroded up to a depth of about 2.5 feet adjacent to the right spillway wall. This erosion has presumably been aggravated by pedestrian traffic. The top and upstream and downstream faces of the dam are covered with a heavy growth of trees and brush extending down to the water line. The left abutment is also heavily wooded.

Two wavecut benches 1 to 2 feet deep were observed on the upstream face of the dam as shown in Photo 2. These benches were apparently caused by wave erosion when the reservoir was at approximately the same elevation as the benches. The majority of the visable surface of the upstream face of the dam consisted of a sandy clay soil with some gravel. No riprap was observed on the upstream face of the dam.

Two significant erosion gullies were observed on the downstream face of the embankment. One gully, located in the center of the embankment, begins at the high water level of the lower reservoir and extends down to the toe of the dam (Photo 3). This gully has been filled with

riprap; however, erosion appears to be continuing at the upper end. The erosion forming this scar may be the result of wave action from the lower reservoir or possibly seepage through the embankment. The local extent of the erosion indicates that seepage is the most probable cause. The second gully is located above the outlet works as shown in Photo 4.

Both the upstream and downstream face of the embankment appear to be sloping more steeply than the 2 horizontal to 1 vertical indicated on design plans.

c. Appurtenant Structures

Spillway

The spillway appears to have been constructed generally as shown on the design plans (Plate 4), with the exception of four concrete cyclindrical piers 10 inches in diameter and 4.5 feet high located adjacent to the spillway crest (Photo 5). These piers reportedly supported a foot bridge across the spillway which was damaged and removed.

There has been minor spalling at the top of the construction joint in the left (east) wingwall, directly above the spillway crest. A vertical crack at the downstream end of the left wingwall and spalling at the top of the adjacent retaining wall was also noted (Photo 6).

There has been minor cracking with no significant displacement of the spillway crest. The construction joint between the west spillway wingwall and training wall has been displaced by about 1/2 inch. The erosion at the toe at the spillway apron, discussed below, is beginning to undermine the foundations of the downstream end of the training walls.

The macadam spillway apron has a slightly undulating surface with a few minor cracks. The most severe irregularities in the apron surface appear to be caused by tree roots. A 1-foot diameter tree is growing in the spillway chute a few feet downstream from the left wingwall.

The downstream toe of the spillway apron has been severely eroded as shown in Photo 7. The abutment on which the apron is founded has been eroded up to a depth of about 4 to 5 feet just downstream of the apron toe. The present toe of the macadum surface is very irregular and has been eroded from 3 to 10 feet upstream from the downstream end of the training walls.

Outlet Works

The upstream and downstream ends of the 20-inch diameter outlet pipe are surrounded by concrete collars and appear to be in satisfactory condition. The upstream reservoir level was below the intake to the outlet pipe at the time of the first inspection. There was miscellaneous debris around the intake to the outlet pipe (Photo 8) and there are no trashracks or similar guards over the intake.

The water level of the lower reservoir was about 6 inches above the invert of the outlet pipe. The outlet pipe valve is housed in a concrete manhole (Photo 9). The steel manhole cover was locked at the time of the inspection; therefore, the valve could not be observed.

d. Reservoir Area

The reservoir was empty at the time of both inspection (Photo 10) and the water flowing into the

reservoir was being pumped over the west abutment of the dam into Reservoir No. 1. The reservoir was being excavated during the inspection. The excavation was reportedly to extend down to a clay layer at a depth of approximately 25 feet below the present reservoir bottom, and thus removing a permeable sand stratum which has caused leakage from the reservoir. Presumably, this sand stratum will be blanketed where it is exposed in the excavation face.

The perimeter of the reservoir generally has moderately steep slopes with local, gently sloping areas. The adjacent area is heavily wooded and populated with single family residences.

e. Downstream Channel

Flow over the spillway empties into Reservoir No. 1, located immediately downstream from the dam. The perimeter of this reservoir is similar to Reservoir No. 2, described above (Photo 11).

SECTION 4: OPERATION PROCEDURES

4.1 Procedures

Normal operation of the reservoir is to maintain maximum storage for recreation purposes. It is reported that the reservoir is lowered when heavy storms are forecast.

The 20-inch diameter outlet pipe is operated by a valve located at the downstream toe of the dam and is used to drain the reservoir for maintenance of the dam and reservoir. Reservoir No. 1 must be emptied to a level at or below the intake to the outlet pipe in order to empty Reservoir No. 2.

It was reported that the reservoir is chemically treated for algae and is drained every few years for cleaning. The reservoir was emptied and cleaned in 1972, 1973 and 1974.

4.2 Maintenance of Dam

The Skyline Lake Property Owners Association are responsible for the maintenance of the dam and reservoir. No records are available regarding the maintenance of the dam, and, based on the visual inspection, little maintenance work has been done.

4.3 Maintenance of Operating Facilities

No maintenance records of operating facilities are available. The outlet works appear to be in satisfactory condition and are reported to function properly.

4.5 Evaluation of Operational Adequacy

It appears that there has been little maintenance of the dam. There is no instrumentation of the dam and records are not kept of maintenance work or operation of the reservoir. A warning system is needed to alert downstream inhabitants in time of floods and possible overtopping or failure of the dam.

SECTION 5: HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

a. Design

As already stated in Section 1.2, Skyline Lake Dam No. 2 is classified as high hazard and small in size. In accordance with the Corps of Engineers' "Recommended Guidelines for Safety Inspection of Dams", the Spillway Design Flood (SDF) is the Probable Maximum Flood (PMF).

Data obtained from State files indicate the drainage basin area of the dam is 2.8 square miles. Elevations within the basin range from about 1150 feet above mean sea level along the perimeter to about 280 feet in the valley floor. Land use pattern within the watershed consist mainly of forested areas, with only a minor portion of the basin area being residential developments. About 0.6 percent of the watershed area is the surface of Skyline Lake No. 1 and about 1.0 percent of the watershed area is Skyline Lake No. 2. The drainage basin is delineated on U.S.G.S. topographic map and is presented on Plate D-1, Appendix D.

The hydraulic and hydrologic features of the dam were evaluated using criteria set forth in the Corps of Engineers' "Recommended Guidelines for Safety Inspection of Dams", and additional guidance and criteria provided by the Philadelphia District, Corps of Engineers. The Probable Maximum Precipitation (PMP) was calculated using Hydrometeorological Report No. 33 and the Hop

Brook reduction factor of 0.80 for misalignment of the storm. The Probable Maximum Flood (PMF) was calculated using the Corps' computer program HEC-1, Dam Break Version. In computing the PMF the Corps requested that the SCS triangular unit hydrograph with curvilinear transformation be used. The computer program was used to calculate this unit hydrograph from the basin lag. A lag time of 1.0 hour was calculated for the basin and used in the program.

An initial infiltration loss of 1.0 inch and a final infiltration loss rate of 0.10 inch per hour were used in the HEC-1 program to give the rainfall excess. Using the excess rainfall and the unit hydrograph, the program computed the peak discharges of the 15 percent, 25 percent, 50 percent and 100 percent PMF. These discharges are approximately 1,580 cfs, 2,640 cfs, 5,270 cfs and 10,540 cfs, respectively.

The various percentages of the PMF inflow hydrograph were routed through Skyline Lake No. 2 assuming the dam does not breach. The routings were made using the Modified Puls Method by the HEC-1 program. The peak discharges of the 15 percent, 25 percent, 50 percent, and 100 percent PMF were calculated to be approximately 1,470 cfs, 2,550 cfs, 5,170 cfs, and 10,430 cfs. The flood routings indicate that all floods greater than about 10 percent of the PMF will overtop the dam. A plot of percent PMF versus peak outflow discharge is presented as Plate D-2 in Appendix D.

The various percentages of the PMF outflow from Skyline Lake No. 2 were routed through Skyline Lake No. 1, which is immediately downstream, using the Modified

Puls Method by the HEC-1 program. The 15 percent, 25 percent, 50 percent, and 100 percent PMF peak discharges from Skyline Lake Dam No. 1 were calculated to be approximately 1,320 cfs, 2480 cfs, 5,110 cfs, and 10,350 cfs. These flood routings indicate that all floods greater than about 15 percent of the PMF will overtop Skyline Lake Dam No. 1 if Skyline Lake Dam No. 2 does not fail. A plot of percent PMF versus peak outflow from Skyline Lake Dam No. 1 is presented as Plate D-5 in Appendix D.

Because the spillways for both Skyline Lake Dam No. 2 and Skyline Lake Dam No. 1 cannot pass one-half the PMF, the various percentage non-breach PMF flows were routed 0.5 miles downstream through two successive reaches to the Borough of Wanaque-Midvale. A second set of flood routings using the same PMF's were routed through both reservoirs and downstream using the assumption that both dams would breach. These routings were made in order to assess the degree of increased flood hazard caused by breaching due to an inadequate spillway. For the downstream channel routings estimates of channel shapes, slopes and roughnesses were made based on conditions observed in the field and on U.S.G.S. topographic maps. The locations of the cross-sections used in the channel routings are shown on page D-7, Appendix D.

Estimates of spillway and overtop stage-discharge curves, reservoir stage-storage curves, and dam breach parameters were used to route the various floods through the two reservoirs. Assumptions and data used in these estimates are described, for each dam, in the following paragraphs.

Skyline Lake No. 2

The spillway and overtop discharge rating curve used in the flood routing through Skyline Lake No. 2 was calculated using the weir equation and assuming free overflow across the whole length of the dam and spillway. The spillway is a broad-crested weir and has an estimated discharge coefficient of 2.6. The dam crest is a broad-crested weir with heavy overgrowth, and has an estimated discharge coefficient of 2.6. The reservoir stage-storage curve was determined from U. S. Geological Survey 7.5 - minute topographic maps and contour maps of proposed excavation of the lake that were obtained from the owner. At the time of the field inspection a significant portion of the proposed excavation was complete and, therefore, in this analysis the ultimate proposed lake topography was assumed. This stage-storage curve was extended above the dam crest to include surcharge storage during peak discharges. In the reservoir routing computations possible discharges through the outlet works were excluded because their capacity is small compared to the PMF and because of the possibility that the outlet valve may be closed. The stage-storage and the spillway and overtop stage-discharge curves for Skyline Lake Dam No. 2 are presented in Appendix D as Plates D-3 and D-4, respectively.

The breach parameters used in the HEC-1 analysis for Skyline Lake No. 2 are: the breach is rectangular in shape, 180 feet long, will extend to the original reservoir floor elevation (260 ft), will begin breaching when the dam is first overtopped, and will develop to its maximum size in 3.0 hours. The peak outflow from Skyline Lake No. 2 for the 15 percent, 25 percent, 50 percent, and 100 percent PMF, assuming failure, were calculated to be approximately 2,620 cfs, 4,020 cfs, 6,580 cfs, and 10,750 cfs, respectively.

Skyline Lake Dam No. 1

The spillway and overtop stage-discharge rating curve used in the flood routings through Skyline Lake No. 1 was calculated using the weir equation and assuming free overflow across the whole length of the dam and spillway. The spillway has an ogee cross-section and from data in the State files has a calculated discharge coefficient of 3.5. The dam crest is a broad crested weir with heavy overgrowth and has an estimated discharge coefficient of 2.6. The reservoir stage-storage curve was estimated from U. S. Geological Survey 7.5 - minute topographic maps. This stage-storage curve was extended above the dam crest to include surcharge storage during peak flood discharges. In the reservoir routing computations possible discharges through the outlet works were excluded because their capacity is small compared to the PMF and because of the possibility that the outlet valves may be closed. The stage-storage and the spillway and overtop stage-discharge curves for Skyline Lake Dam No. 1 are presented in Appendix D as Plates D-6 and D-7, respectively.

The breach parameters used in the HEC-1 analysis for Skyline Lake No. 1 are: the breach is rectangular in shape, 160 feet long, will extend to the approximate original reservoir floor elevation (259.3'), will begin breaching when the dam is first overtopped, and will develop to its maximum size in 1 hour. The peak outflow from Skyline Lake for the 15 percent, 25 percent, 50 percent and 100 percent PMF assuming failure, were calculated to be approximately 4,570 cfs, 5,910 cfs, 6,550 cfs, and 10,610 cfs, respectively.

The above described analyses resulted in the flooding characteristics at the Borough of Wanaque-Midvale that are summarized in the following tabulation.

No Breaching	15% PMF	25% PMF	50% PMF	100% PMF
Peak Discharge, cfs	1,305	2,450	5,080	10,240
Peak Flow Depth, ft.	5.8	7.1	9.1	11.5
Peak Flow Width, ft.	135	185	265	400
Peak Flow Velocity, fps	4.4	4.9	5.3	5.9
Breaching				
Peak Discharge, cfs	4,490	5,840	6,410	10,560
Peak Flow Depth, ft.	8.7	9.5	9.8	11.6
Peak Flow Width, ft.	250	280	290	405
Peak Flow Velocity, fps	5.2	5.5	5.6	5.9

The reservoir drain intake for Skyline Lake No. 2 is at the floor of the lake near the dam and is 20 inches in diameter. Using the orifice flow equation, and assuming no tailwater and no inflows into the lake, the time required to drain the reservoir from a spillway full condition was calculated to be a little over 4 days.

b. Experience Data

Records of lake levels are not maintained for this site. The reservoir is operated to maintain maximum water levels for aesthetic and recreational purposes.

c. Visual Observations

The perimeter of the reservoir has generally moderately steep slopes with local, gently sloping areas. The adjacent area is heavily wooded and populated with single family residences.

A stilling basin is located immediately downstream of Skyline Lake Dam No. 1 and a bridge and playground are located approximately 300 and 500 feet downstream, respectively. The banks of the flood plain are moderately steep immediately downstream from the dams. The flood plain becomes wider and the banks less steep farther downstream from the dam.

d. Overtopping Potential

As indicated in Section 5.1-a, the spillway can pass only 10 percent of the PMF. During the PMF the embankment would be overtopped for about 7.0 hours and would have a maximum overtopping stage of about 5.8 feet above the dam crest. This overtopping height assumes the dam remains in its current condition. During the PMF, Skyline Lake Dam No. 2 would probably fail due to overtopping and cause overtopping and failure of downstream Dam No. 1. This would result in a significantly larger flood downstream and a significantly higher hazard to several residences in the Borough of Wanaque-Midvale that are near the stream banks and at elevations below the maximum flood stage. Thus, in accordance with the Corps' guidelines, the spillway for Skyline Lake Dam No. 2 is classified as Seriously Inadequate.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Visual inspection indicates that the dam is need of maintenance work to assure continued structural integrity. There is significant local erosion of the downstream face of the embankment and the toe of the spillway apron is badly eroded. Some cracking and spalling at the concrete wingwalls was also observed. These factors are not presently severe enough to affect the structural strength or stability of the dam, but could jeopardize the integrity of the structure if left unchecked.

The outlet works appear to be in satisfactory condition based on visual observations.

b. Design and Construction Data

The available design and construction data are inadequate to evaluate the structural stability, since little is known of design criteria, construction methods or as-built material properties.

c. Operating Records

There is no instrumentation of the dam. The reservoir is essentially uncontrolled except for occasional draining of the reservoir for repairs of the dam and cleaning of the reservoir. Records of reservoir levels and water withdrawals are not available.

d. Post-Construction Changes

A 3-inch thick layer of macadam was placed over the original spillway apron which was severely eroded shortly after the initial filling of the reservoir. The toe of this new apron has since been severely eroded. In addition, a clay blanket was reportedly placed on the upstream face of the dam to reduce seepage observed under the spillway.

e. Seismic Stability

The dam is located in Seismic Zone 1, in which it may generally be assumed that there is no hazard from earthquakes, provided static stability conditions are satisfactory and conventional safety margins exist. However, as pointed out in Section 2.1-a, the dam is close to the seismically active Ramapo Fault, and the valley in which the dam is located may be structurally controlled. Data are insufficient at this time to assess seismic stability, should a significant earthquake occur in the vicinity of the dam.

SECTION 7: ASSESSMENT, RECOMMENDATIONS, PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety

The structural stability of Skyline Lake Dam No. 2 cannot be quantitatively analyzed due to lack of available data. However, visual inspection indicates that the dam is in need of repairs to assure continued structural integrity. Significant local erosion of the downstream face of the embankment and toe of the spillway apron was noted. In addition, there has been wave erosion of the upstream face of the embankment causing local steepening of the slope. There has been minor cracking and spalling of the concrete spillway wingwalls.

The spillway of the dam can pass only 10 percent of the Probable Maximum Flood and is classified as seriously inadequate.

b. Adequacy of Information

The information available is not adequate to perform a comprehensive, definitive evaluation of the dam's structural stability because of the lack of data regarding as-built conditions and physical properties of the dam and foundation materials.

c. Urgency

The deficiencies revealed by the visual inspection do not appear to be critical; however, they could imperil the integrity of the structure if left unchecked. Therefore, it is recommended that the owners perform the remedial measures discussed below, the most urgent of which should be done as soon as possible.

d. Necessity for Additional Data/Evaluation

At the present time there is insufficient information available to fully evaluate the structural stability of the dam. The Corps of Engineers Guidelines require that, in general, seepage and stability analyses should be on record for all dams in the high hazard category. There is presently no information about the as-built properties of the embankment. In addition, seepage at the toe of the dam has been previously noted by others. Therefore, a program of borings and laboratory tests should be performed to confirm the as-built properties of the embankment materials. Piezometers should also be installed to establish internal water levels in the downstream slope. These data should be evaluated by an experienced geotechnical engineer. The piezometers should be permanent and read periodically. The field investigation should begin in the near future and the evaluation performed soon after completion of the field work and testing. In addition, the dam should be surveyed in the near future to confirm the as-built geometry of the dam. As a result of the foregoing, necessary corrective steps should be taken in a timely manner.

The hydrologic analysis indicates that the spillway is seriously inadequate. Therefore, more sophisticated and detailed hydrologic analyses should be performed as soon as possible. From this a positive action program of corrective measures should be developed and implemented as necessary.

Although the dam is located in Seismic Zone 1, it is situated in a valley which was possibly formed as the result of faulting and is in close proximity to the seismically active Ramapo Fault. Therefore, the potential seismicity at the dam site and its effect on the stability of the dam should be investigated.

7.2 Remedial Measures

a. Corrective Procedures

It is recommended that the following remedial measures be performed as soon as possible:

1. The upstream embankment should be graded to the design slope and riprap or other suitable slope protection should be placed on the embankment to prevent further wave erosion.
2. Erosion scars on the downstream face of the embankment and the eroded section of embankment adjacent to the west wingwall should be filled and compacted with a suitable earthfill. If inspection of the embankment when the upper reservoir is full indicates that the erosion on the downstream face is caused by seepage, remedial measures to eliminate the seepage should be performed.
3. The eroded portion of the downstream toe of the spillway apron should be replaced and resurfaced in such a manner as to avoid further deterioration.
4. Remove the bridge piers from the spillway.

b. Operation and Maintenance Procedures

A program of inspections of the dam during and after critical floods and annually should be initiated by the owners, utilizing the standard visual checklist in this report.

The cracking and spalling of the spillway wingwalls should be carefully observed, and remedial work performed, should the deterioration continue.

A permanent record should be kept of all maintenance and operating events of the dam and reservoir.

All brush and small trees should be removed from the embankment soon, in order to facilitate inspection of the embankment and prevent root damage. Clearing of the embankment should continue as a standard maintenance procedure.

A warning system in coordination with Skyline Lake Dam No. 1 should be established whereby downstream inhabitants may be notified and evacuated in the event of possible dam failure.

A trash rack should be placed over the intake to the outlet conduit as soon as possible.

PLATES

PLATE 1



1000 0 1000 2000 3000 4000

SCALE IN FEET

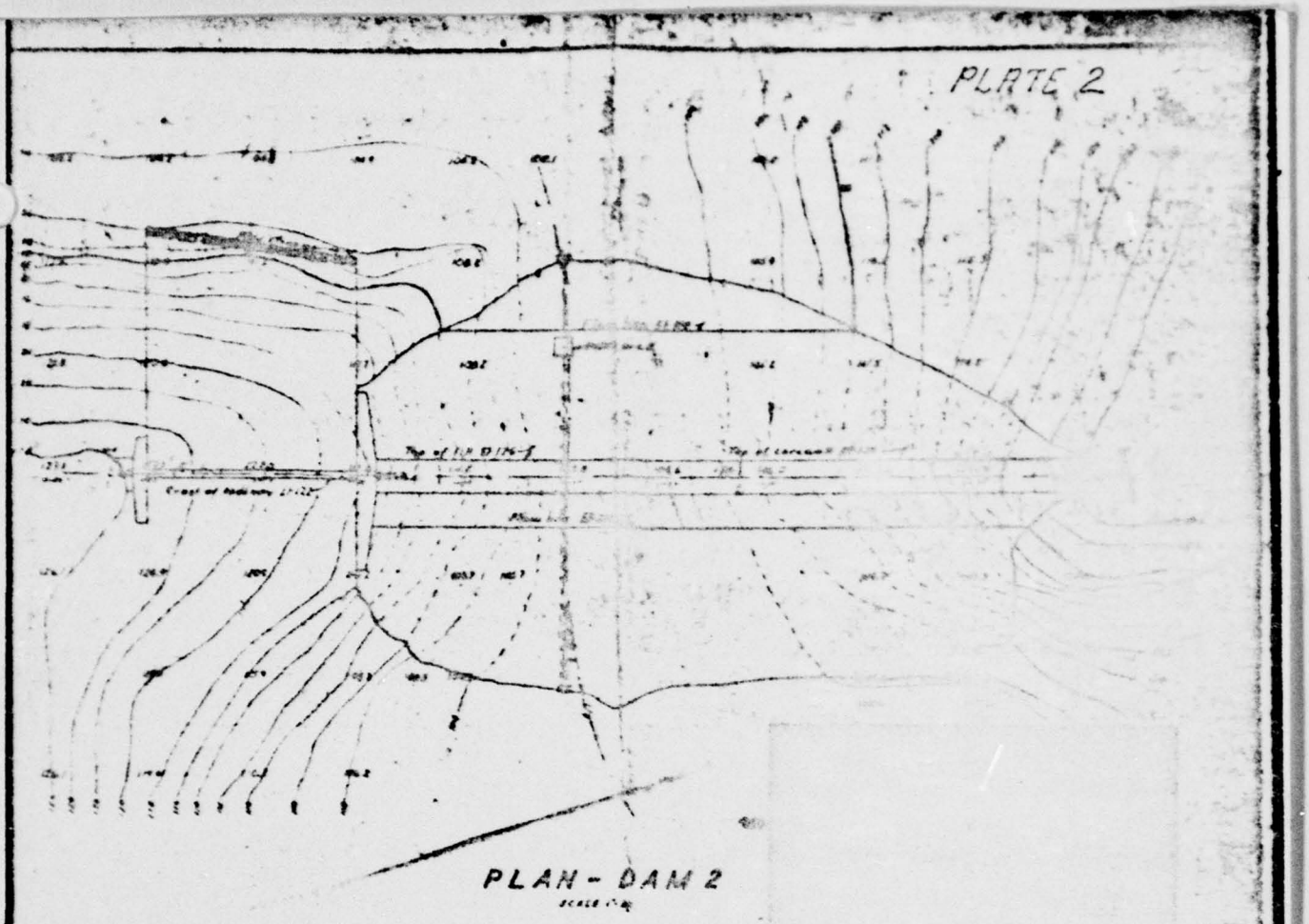


AREA LOCATION

VICINITY MAP

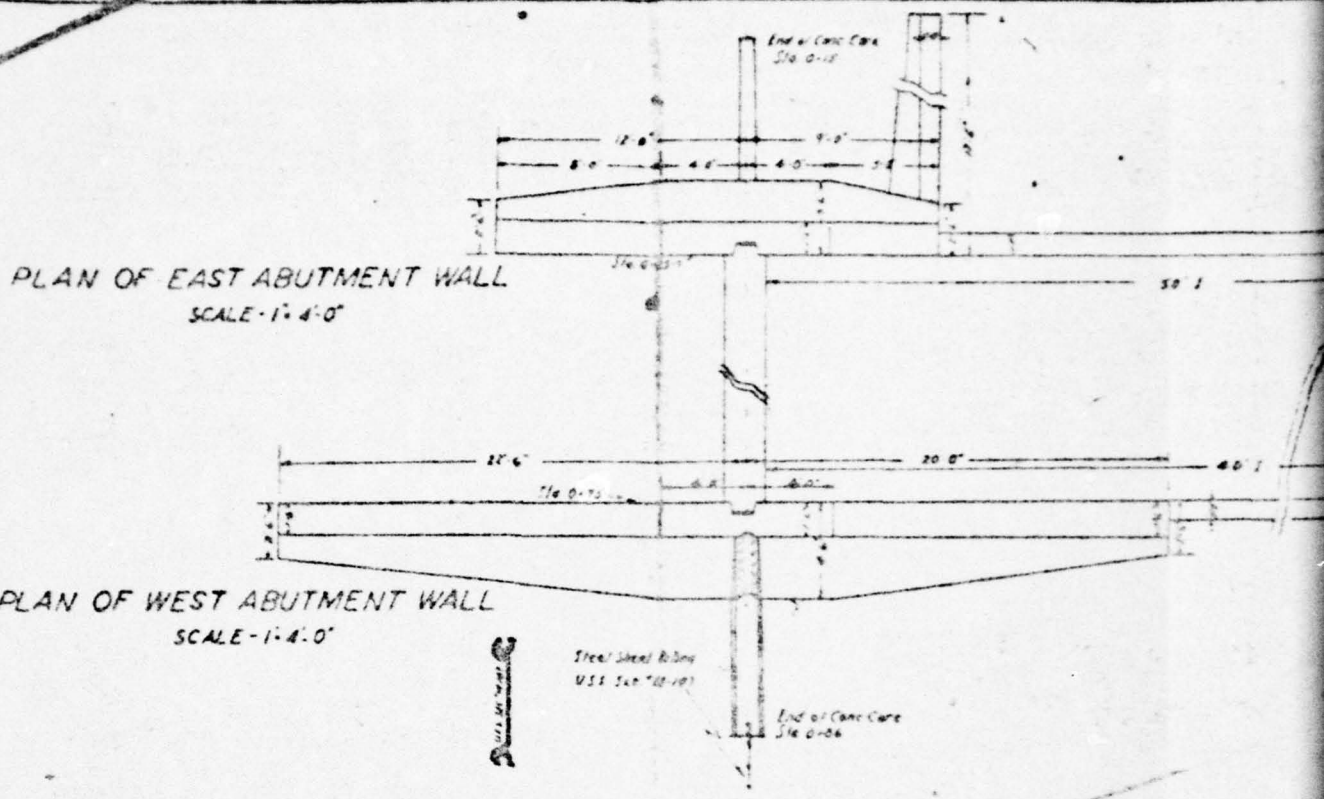
JENNY-LEEDSHILL JANUARY 1979

PLATE 2



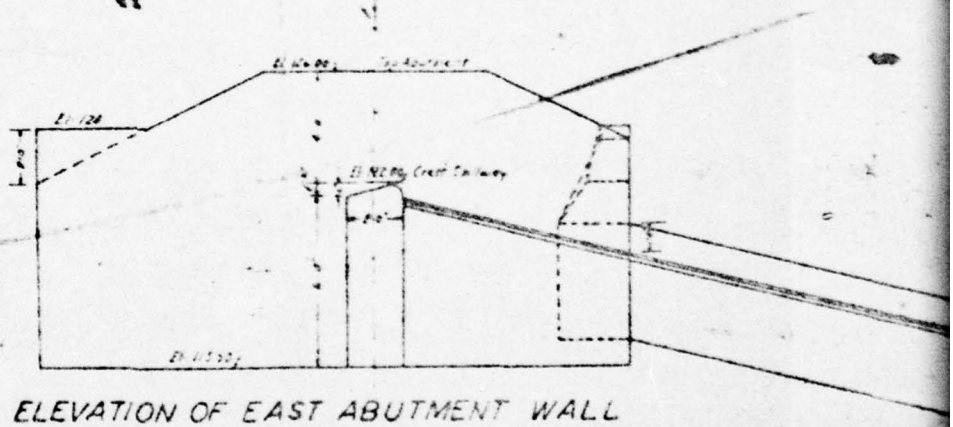
PLAN - DAM 2

PROFILE - DAM 2

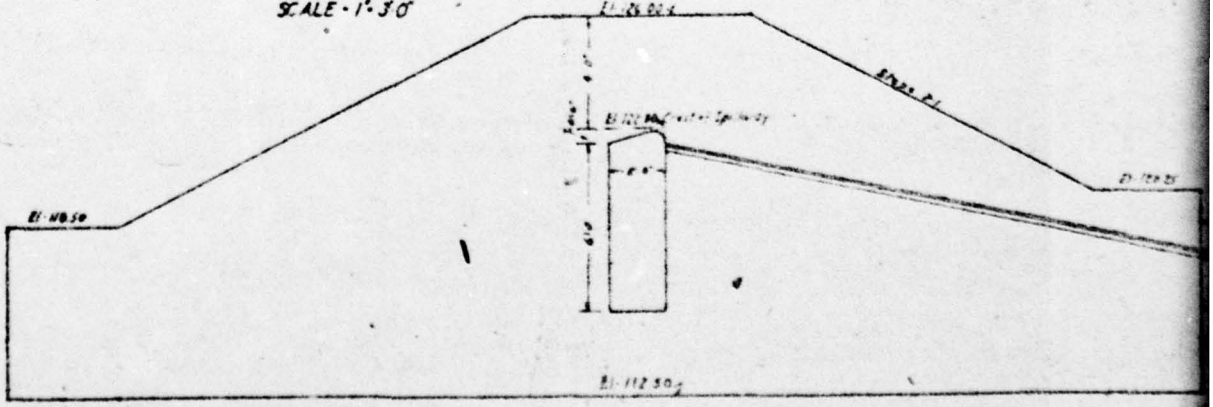


PLAN OF EAST ABUTMENT WALL
SCALE - 1" = 4'-0"

PLAN OF WEST ABUTMENT WALL
SCALE - 1" = 4'-0"



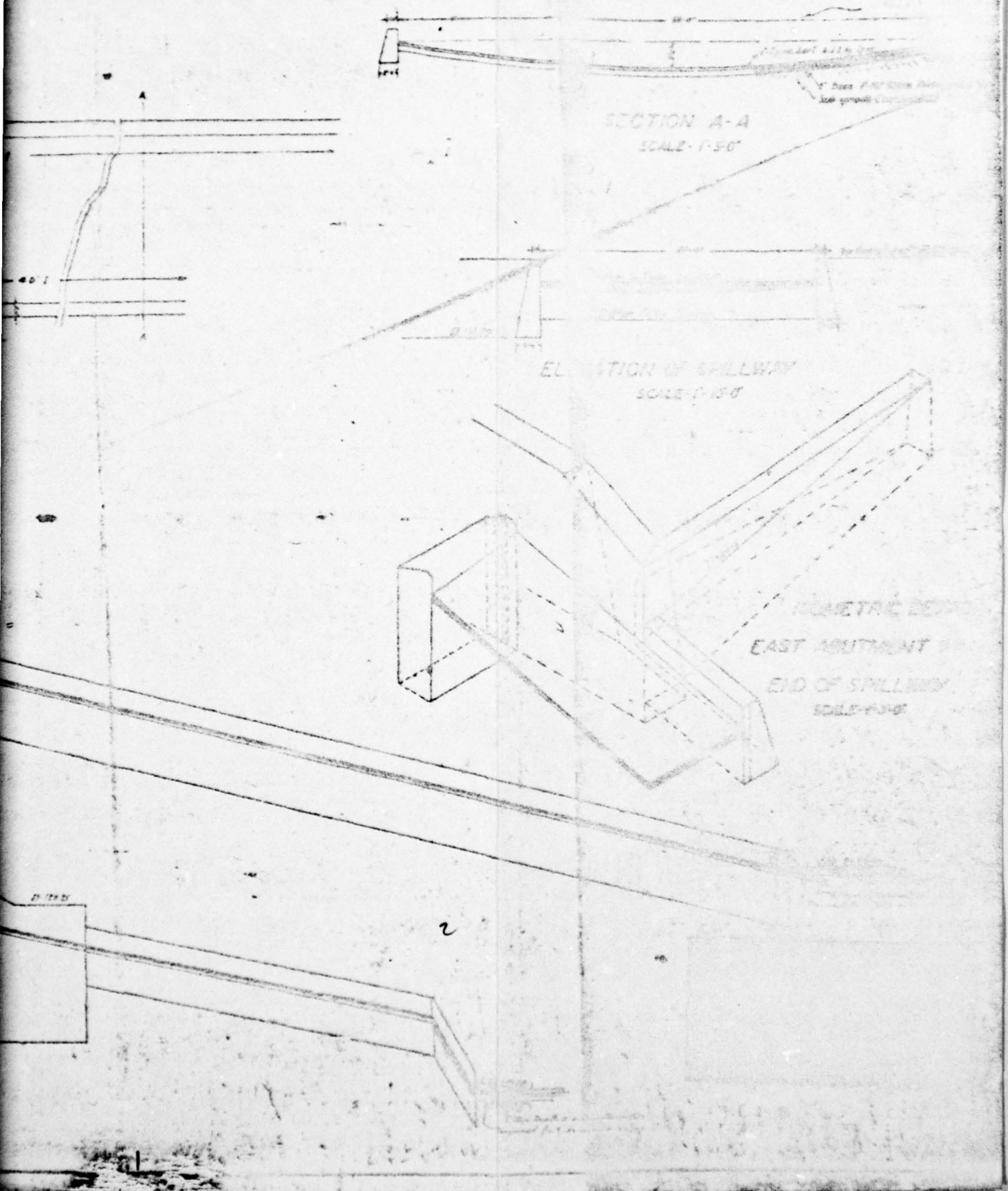
ELEVATION OF EAST ABUTMENT WALL
SCALE - 1" = 3'-0"

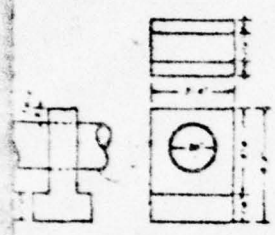


ELEVATION OF WEST ABUTMENT WALL
SCALE - 1" = 3'-0"

DAM 2 SH

PLATE 3

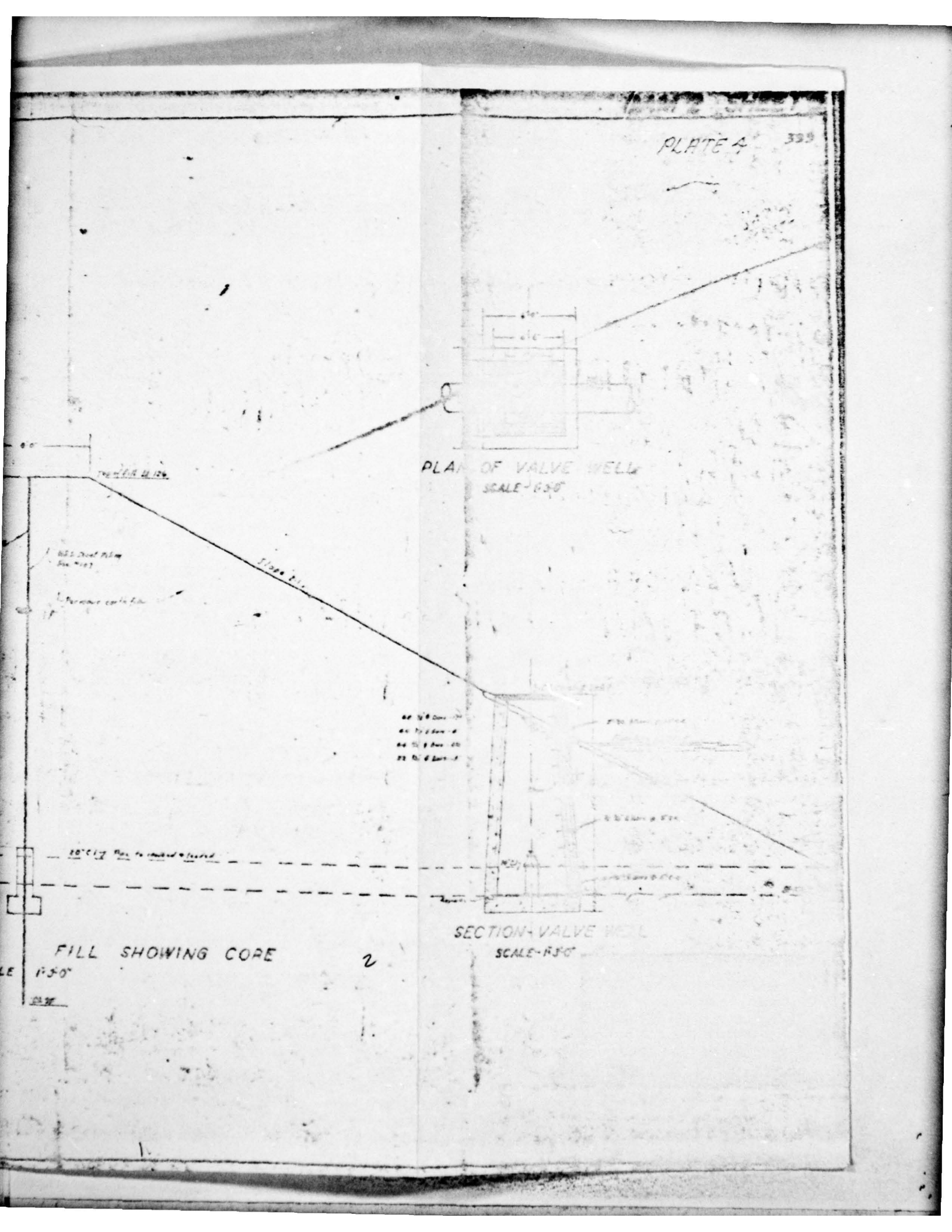




HEAD WALLS
SCALE · 1"=5'-0"

TYPICAL SECTION OF FIL
SCALE 1"=5'-0"

PLATE 4 339



FILL SHOWING CORE 2

LE 1-3-0"

APPENDIX A

CHECK LIST - VISUAL OBSERVATIONS

CHECK LIST - ENGINEERING, CONSTRUCTION MAINTENANCE DATA

Check List
Visual Inspection
Phase 1

Name Dam Skyline Lake No. 2 County Passaic State New Jersey Coordinators NJDEP

Coordinates: Lat. 41° 04' 10" N
Long. 74° 16' 27" W

Date(s) Inspection Dec. 1, 1978 & Dec. 20, 1978 Weather Clear Temperature 42°F

Pool Elevation at Time of Inspection Empty M.S.L. Tailwater at Time of Inspection 282 ft. (approx.) M.S.L.

Inspection Personnel:

(December 1, 1978)
R. C. Gaffin
P. L. Wagner
A. R. Slaughter

(December 20, 1978)
R. J. Jenny
D. J. Lachel

(December 20, 1978)
F. L. Panuzio
A. R. Slaughter

R. C. Gaffin Recorder

Owner Representative:
(December 1, 1978)
Mrs. K. Rausch, Skyline Lake Property Owners Assoc.

CONCRETE/MASONRY DAMS

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Not Applicable	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Not Applicable	
DRAINS	Not Applicable	
WATER PASSAGES	Not Applicable	
FOUNDATION	Not Applicable	

CONCRETE/MASONRY DAMS

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBERSVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Not Applicable	
STRUCTURAL CRACKING	Not Applicable	
VERTICAL AND HORIZONTAL ALIGNMENT	Not Applicable	
MONOLITH JOINTS	Not Applicable	
CONSTRUCTION JOINTS	Not Applicable	

EMBANKMENT

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Minor cracking of concrete wall which caps steel sheet piling near center of embankment. One crack has approximately 1/2" separation. No cracking of embankment noted.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES A-4	-Two benches cut in upstream face of dam presumably due to reservoir wave action. -Erosional gully extends from outlet valve chamber to top of dam. A second gully which has been partly filled with riprap was observed in the center of the downstream face. Embankment has been eroded to a maximum of approximately 2.5 feet deep adjacent to the right spillway wingwalls.	Fill and compact eroded areas with suitable earth fill.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Horizontal alignment of crest appear to be as shown on plans. Steel sheet piling and concrete wall extend up to 6 inches above crest, indicating possible settlement or erosion of fill.	
RIPRAP FAILURES	No riprap was observed or upstream face of dam contrary to plans. Scattered cobble to boulder size stones on lower downstream face of dam.	Place riprap on upstream face of dam from the crest to approximately 5 feet below the lowest standard reservoir level.

EMBANKMENT

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	Numerous trees up to 2 feet in diameter, and undergrowth on embankment and left abutment.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Embankment has been eroded up to 2.5 feet deep adjacent to the right (west) spillway wingwall.	Fill and compact with suitable earth fill to the top of wingwalls.
ANY NOTICEABLE SEEPAGE	None observed. Reservoir was empty during inspection.	
STAFF GAGE AND RECORDER	None	
DRAINS	None	

OUTLET WORKS

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed	
INTAKE STRUCTURE	Concrete collar around end of 20-inch diameter cast iron outlet pipe in good condition. No trashrack. Empty oil drum, automobile tire and other rubbish in vicinity of intake.	Place trashrack over intake to outlet pipe.
OUTLET STRUCTURE	Concrete collar around end of 20-inch diameter cast iron outlet pipe at downstream toe of dam. Approximately 6 inches of water at outlet but no flow was noted. Concrete valve chamber with locked steel manhole cover located approximately 20 ft. upstream from outlet. Outlet pipe and of valve chamber appear to be in good condi-	tion. Could not observe outlet valve due to locked cover.
OUTLET CHANNEL	None. Reservoir located immediately downstream.	
EMERGENCY GATE	None	

UNGATED SPILLWAY

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Minor cracking with no offset noted in spillway crest.	
APPROACH CHANNEL	Earth fill extends to spillway crest.	
DISCHARGE CHANNEL	Coarse aggregate macadam covered chute approximately 8 inches thick with concrete training walls. Severe erosion of downstream toe of chute. Undulating apron surface due to tree roots and/or settlement and minor cracking. Tree in spillway chute near east wingwall.	Toe of apron should be repaired.
BRIDGE AND PIERS	Four cylindrical concrete posts, 10 inches in diameter and 4.5 feet high, are located adjacent to the spillway crest; two upstream and two downstream.	These posts reportedly were used to support a foot bridge which was damaged and removed.
	Spalling noted at top of construction joint in center of west wingwall. Approximately 1/2-inch displacement between west wingwall and training wall. Vertical cracking and spalling noted at downstream	end of east wingwall.

GATED SPILLWAY

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not Applicable	
APPROACH CHANNEL	Not Applicable	
DISCHARGE CHANNEL	Not Applicable	
BRIDGE AND PIERS	Not Applicable	
GATES AND OPERATION EQUIPMENT	Not Applicable	

INSTRUMENTATION

Skyline Lake Dam No. 2

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

RESERVOIR

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Generally moderately steep slopes with local gentle slopes; heavily wooded with single family residences.	
SEDIMENTATION	Reservoir was drained and being dredged during inspection. Sedimentation does not appear to be serious.	Reservoir is reportedly drained and cleaned every few years.

DOWNSTREAM CHANNEL

Skyline Lake Dam No. 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Reservoir No. 1, located immediately downstream from Dam No. 2 was receiving water pumped from Reservoir No. 2 over the right abutment of dam.	
SLOPES	Slopes of the downstream reservoir are similar to those of the upstream reservoir. See 'Reservoir'.	
APPROXIMATE NO. OF HOMES AND POPULATION	Numerous single family residences around perimeter of lower reservoir. Approximately 6 houses in the Borough of Wanaque-Midvale are within the downstream flood path below Skyline Lake Dam No. 1.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Skyline Lake Dam No. 2

ITEM	REMARKS
PLAN OF DAM	Sheets 2, 4, and 5 together with title sheet entitled "Plan and Profile for Construction of Dams at Skyline Lake, Borough of Ringwood, Passaic County, July 10, 1945", prepared by Newell Harrison, P.E., submitted with Report on Dam Application No. 399.
REGIONAL VICINITY MAP	Dam and reservoir are shown on U.S. Geological Survey, Wanaque Quadrangle (Scale: 1:24,000).
CONSTRUCTION HISTORY	Twelve Monthly Progress Reports on the construction of the dam prepared by the design engineer are available.
TYPICAL SECTIONS OF DAM	See 'Plan of Dam'
HYDROLOGIC/HYDRAULIC DATA	An estimated probable maximum flood runoff of 730 cfs was used to determine required spillway dimensions by the State Water Policy Commission. (letter dated June 20, 1944)
OUTLETS - PLAN - DETAILS -CONSTRAINTS -DISCHARGE RATINGS	 See 'Plan of Dam' None None Available
RAINFALL/RESERVOIR RECORDS	None Available

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Skyline Lake Dam No.2

ITEM	REMARKS
DESIGN REPORTS	None Available
GEOLOGY REPORTS	None Available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None Available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Application for Permit for Construction or Repair of Dam No. 399 dated June 27, 1945 indicates that the foundation material is 'sand, gravel, clay and hardpan as determined by test holes'. However, no boring records, laboratory or field data are available.
POST-CONSTRUCTION SURVEYS OF DAM	Contour maps and sections of Reservoir No. 2, prepared for dredging the reservoir by William Wirring, dated Jan. 31, 1978.
BORROW SOURCES	Unknown

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Skyline Lake Dam No. 2

ITEM	REMARKS
SPILLWAY-PLAN -SECTIONS -DETAILS	See 'Plan of Dam'
OPERATING EQUIPMENT PLANS & DETAILS	See 'Plan of Dam'
MONITORING SYSTEMS	None
MODIFICATIONS	Three inches of bituminous macadam was added to the surface of the spillway chute after construction as noted in the State's inspection report dated May 20, 1947.
HIGH POOL RECORDS	None Available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Skyline Lake Dam No. 2

ITEM	REMARKS
MAINTENANCE OPERATION RECORDS	None

APPENDIX B

PHOTOGRAPHS

(Note: All photographs were taken on Dec. 1, 1978)



Photo 1
View of embankment crest looking west from spillway



Photo 2 View of upstream face of dam looking east



Photo 3 View of stone filled gully in central section of the downstream face of embankment



Photo 4 View of gully at eastern end of the downstream face of embankment looking down from dam crest

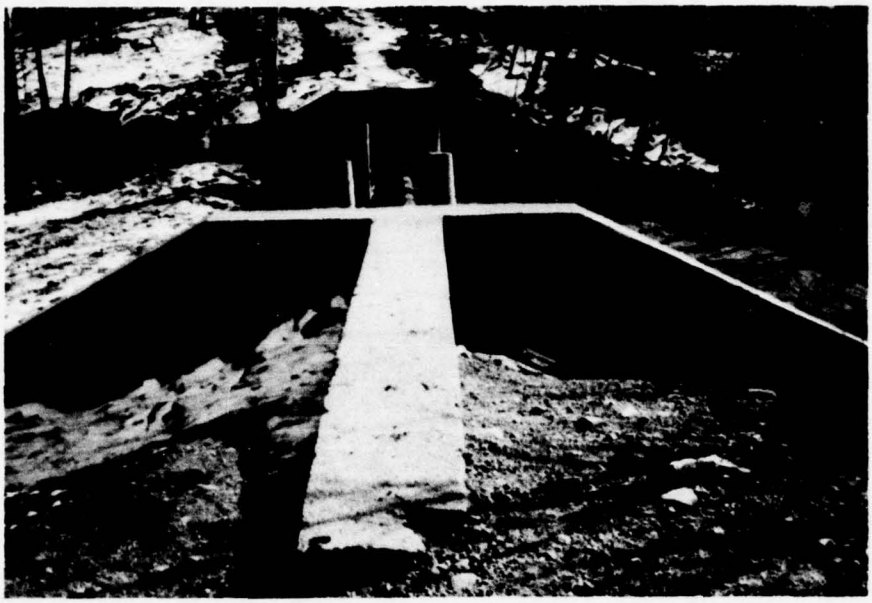


Photo 5 View of spillway looking east

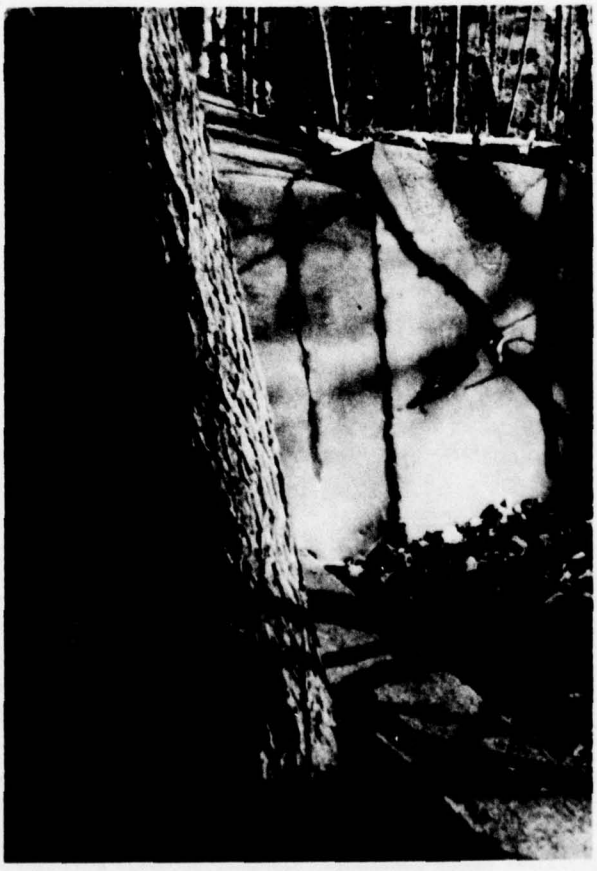


Photo 6 View of downstream end of left (east) wing wall

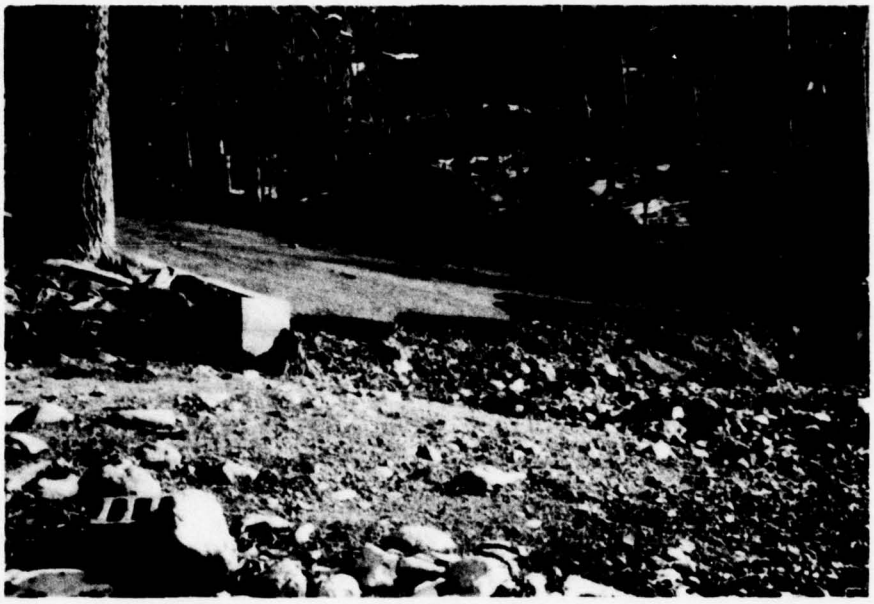


Photo 7 View of spillway apron



Photo 8 View of intake to outlet pipe



Photo 9 View of outlet pipe and valve chamber at downstream toe of dam



Photo 10 View looking upstream from dam

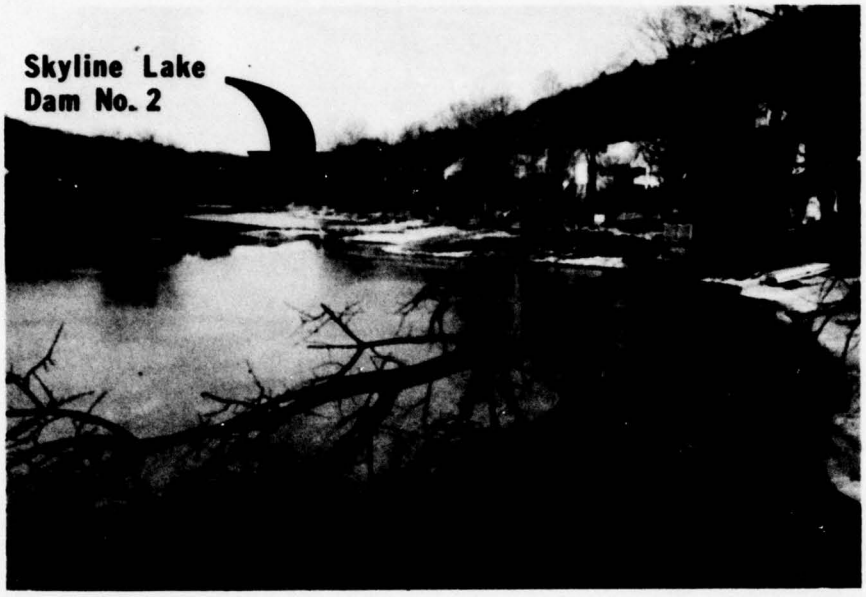


Photo 11 View of downstream reservoir area looking upstream from Dam #1

APPENDIX C

REGIONAL GEOLOGY - HIGHLANDS PROVINCE

REGIONAL GEOLOGY - HIGHLANDS PROVINCE

Physiography

The New Jersey Highlands extend northeast-southwest across the state from the New York border to the Delaware River. Included in the province are the northwest portions of Hunterdon, Passaic and Morris Counties and the southeastern portions of Warren and Sussex Counties. This province lies between the Appalachian Ridge and Valley Province to the northwest and the Piedmont Lowlands Province to the southeast (See Figure C-1) and is part of the larger New England Physiographic Province.

The Highlands are characterized by rounded and flat-topped northeast-southwest ridges and mountains up to 1,400 feet high separated by narrow valleys. The orientation of the valleys is usually, but not always, controlled by the underlying geologic structure.

Bedrock

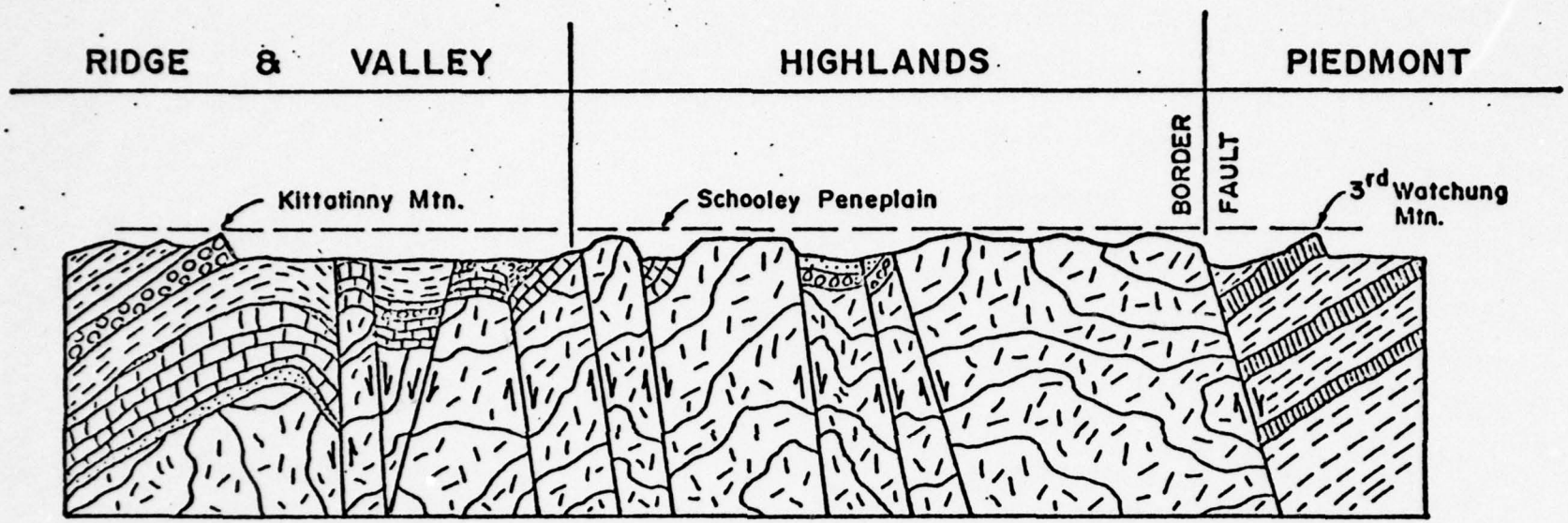
Bedrock of the region is predominently Precambrian gneisses, schists and metasediments. Some sedimentary rocks, typically sandstones, shales and conglomerate have been infolded and infaulted into the valley bottoms.

The regional geologic structure reflects the very old age of bedrock. A number of regional faults cross the area in a northeast-southwest direction. The Ramapo Fault scarp, forming the eastern border of the province, is more than 30 miles long. Faults also control many of the river valley orientations.

Mountain crests slope uniformly from northwest to southwest, a direct result of the fact that the entire area was once part of the now dissected Schooley peneplain.

Overburden

Much of the province was covered by the Pleistocene age Wisconsin glacier. The glacier stripped most of the existing overburden and weathered rock and uncovered the numerous hard bedrock knobs and ridges seen throughout the province. Most of the side-slopes in the area are covered with heavy boulder tills (ground moraine), while glacial outwash and recent alluvium cover the valleys. South of the terminal moraine extending from Morristown to Belvidere, scattered remnants of earlier stages of glaciation (Illinoian and Kansan) have deposited ground moraine (glacial tills) over the bedrock. In the valleys and over some of the ground moraine, recent and glacio-fluvial alluviums have been deposited.



SCHEMATIC CROSS-SECTION OF NEW JERSEY HIGHLANDS PHYSIOGRAPHIC PROVINCE (AFTER WOLFE, 1977)

JENNY / LEEDSHILL
JANUARY 1979

FIGURE C-1

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

SKYLINE LAKE No. 2

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 2.8 SQUARE MILES

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 280.3 FT (330 AF)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 284.3 (400 AF)

ELEVATION MAXIMUM DESIGN POOL: —

ELEVATION TOP DAM: 284.3 FT

CREST: SPILLWAY

a. Elevation 280.3
b. Type CONCRETE WALL
c. Width 1'
d. Length 50 FT
e. Location Spillover LEFT ABUTMENT (LOOKING DOWNSTREAM)
f. Number and Type of Gates NONE

OUTLET WORKS:

a. Type 20" DIA. & GATE VALVE
b. Location RIGHT SIDE OF SPILLWAY (LOOKING DOWNSTREAM)
c. Entrance inverts 261.8
d. Exit inverts —
e. Emergency draindown facilities

HYDROMETEOROLOGICAL GAGES: NONE

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 1040 CFS

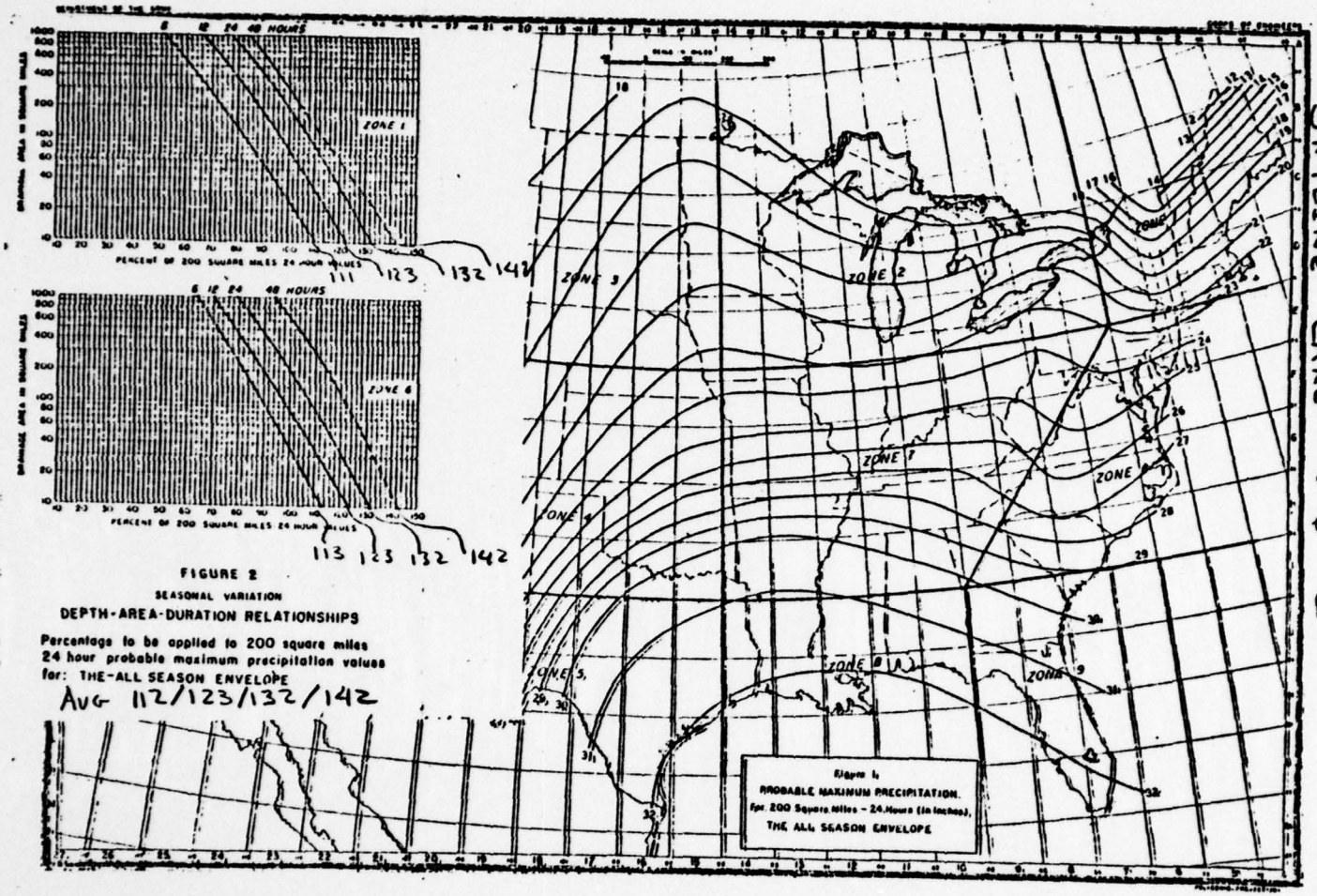


FIGURE 2

SEASONAL VARIATION

DEPTH-AREA-DURATION RELATIONSHIPS

Percentage to be applied to 200 square miles 24 hour probable maximum precipitation values for: THE-ALL SEASON ENVELOPE

AVG 112/123/132/142

D-2

SKYLINE LAKE #1 & #2

SKYLINE LAKE No. 1 & 2

CHAMPION LINE NO. 636-P LEEDS, HILL AND JEWETT, INC.

BY RBE DATE 781220 CLIENT N.J. SHEET NO. 1 OF 2

CHKD DATE JOB TIME OF CONCENTRATION JOB NO. 302

DATA

L = STREAM LENGTH FROM WATERSHED OUTLET TO THE MOST DISTANT RIDGE = 4.05 mi

L_{CA} = STREAM LENGTH FROM BASIN CENTROID = 2.15 mi

H = DIFF BETWEEN ELEV AT OUTLET AND ELEV AT MOST DISTANT POINT = 830-245 = 585'

T_C = TIME OF CONCENTRATION OR TIME FOR WATER TO FLOW FROM THE MOST DISTANT POINT IN THE WATERSHED TO THE WATERSHED OUTLET

T_L = LAG TIME FROM CENTER OF EXCESS RAINFALL TO TIME OF PEAK. $= 0.6\,T_C$

METHOD 1

$$T_C = \frac{L^{1.15}}{7700\,H^{0.38}}$$

L IN FT
H IN FT

$$T_L = \frac{0.6\,L^{1.15}}{7700\,H^{0.38}}$$

METHOD 2

$$T_C = \left(\frac{11.9\,L^3}{H}\right)^{0.385}$$

L IN MILES
H IN FT

$$T_L = 0.6\left(\frac{11.9\,L^3}{H}\right)^{0.385}$$

METHOD 3

$$T_L = C_T\left(\frac{L\,L_C}{S^{1/2}}\right)^{0.38}$$

S IN FT/MI S = H/L = 2.7

$$T_L = C_T\left(\frac{L\,L_C}{(H/L)^{1/2}}\right)^{0.38}$$

C_T = (1.2) MOUNTAIN
= 0.72 FOOTHILL
= 0.35 VALLEY DRAINAGE AREA

METHOD 4

$T_C = L/V$

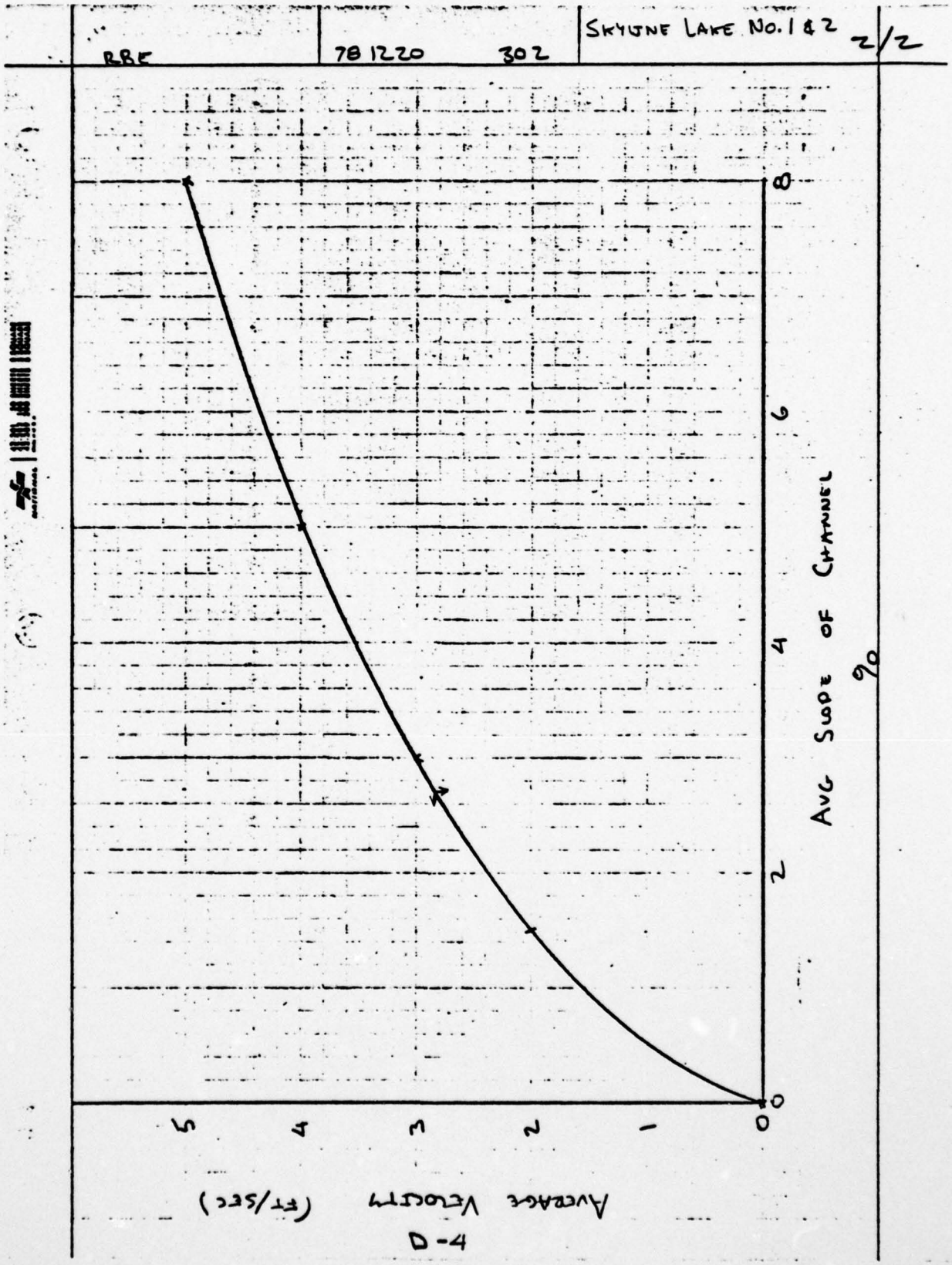
$T_L = 0.6\,L/V$

V = AVG VELOCITY FROM CURVE OF V VS. AVG SLOP

V = 2.8 fps

DAM SKYLINE #2

LAG IN HOURS METHODS 1	2	3	4	USE
0.7	0.7	1.1	1.3	1.0


AVG SLOPE OF CHANNEL
90
0
2
4
6
8
0
1
2
3
4
5
AVERAGE VELOCITY (FT/SEC)

LEEDS, HILL AND JEWETT, INC.

BY RBE DATE CLIENT N.J. DAM SAFETY SHEET NO. OF

CHKD DATE JOB JOB NO. 302-03

REFERENCES

METHOD 1 - FROM "HANDBOOK OF APPLIED HYDROLOGY" BY CHOW MCGRAW HILL PP 21-10, 11

METHOD 2 - FROM CALIFORNIA CULVERTS PRACTICE, CALIF HIGHWAYS AND PUBLIC WORKS, SEPT 1942 SEE USBR DESIGN OF SMALL DAMS PG. 71

METHOD 3 - FROM HYDROLOGY FOR ENGINEERS LINSLEY / KOHLER / PAULHUS 1975 PP 247-248

METHOD 4 - FROM U.S. NAVY - TECHNICAL PUBLICATION NAVDOCKS TP-PW-5 TABLE 8B, MARCH 1953 SEE USBR DESIGN OF SMALL DAMS PG. 70

RBE 750207 | SKYLINE LAKE No. 1 & 2 | 302-03

LOCATION MAP OF CROSS-SECTIONS USED IN ROUTING CALCULATIONS



LEEDS, HILL AND JEWETT, INC.

BY RGF DATE 7/9/23 CLIENT NEW JERSEY SHEET NO. OF

CHKD DATE JOB SKYLINE #1 & #2 JOB NO. 202-01

SKYLINE LAKE No. 1 AND No. 2

Channel Cross-Sections ℄

Station	Distance Downstream of Dam (ft)	Manning's n Left Overbank	Manning's n Main Channel	Manning's n Right Overbank	Channel Invert (ft)	Max Elev. (ft)	Reach Length (ft)	Energy Grade Line Slope	X or Y	X or Y (ft) 1	2	3	4	5	6	7	8
Skyline No. 1																	
4 - Below Dam	150	0.10	.045	0.10	257	290	150	0.006	X	0	150	490	500	525	535	700	1150
									Y	290	280	261	257	257	261	280	290
5	2400	.045	.045	.045	250	280	2250	0.004	X	0	1000	1181	1150	1175	1175	1300	1600
									Y	280	260	253	250	250	253	260	280

℄ Looking Upstream

℄ See Vertical Chan. Sheet

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (continued)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

MAIN CHANNEL
STATIONS 455

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (continued)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

OPEN-CHANNEL HYDRAULICS

VEN TE CHOW, Ph.D.

Professor of Hydraulic Engineering
University of Illinois

Breach Parameters ⊥/

Breach width = 180 ft.
Breach Shape = Rectangular
Time to maximum Breach size = 3 hours.
Begin Breach when first overtopped
Breach to elevation 262.8

⊥/ Based on previous studies of actual dam failures

Thu 790219	Skyline Lake #1	

Breach Parameters ±/

Breach width = 160 ft.
Breach shape = Rectangular
Time to Maximum Breach Size = 1 hour
Begin Breach when first overtopped
Breach to Elevation 259.3

±/ Based on previous studies of actual dam failures

RBC	790130	SKYLINE LAKE No. 2	302-03

DRAWDOWN CALCULATION [1]

ELEV. (FT)	STO. (AF)	Δ STO (AF)	MEAN HEAD (FT)	Δ TIME HR	Σ TIME HR
280.3	330				
		90	15.9	26.0	
275	240				26
		65	10.7	22.9	
270	175				48.9
		60	5.7	29.0	
265	115				77.9
		30	1.6	27.3	
261.8	85				105.2

20" PIPE & GATE VALVE

USE ORIFICE EQUATION

$$Q = CA\sqrt{2g}\sqrt{H}$$

ASSUME C = 0.6

$$Q = 0.6\left(\frac{\pi}{4}\left(\frac{20}{12}\right)^2\right]\sqrt{2g}\sqrt{H}$$

$$Q = 10.5\ H^{1/2}$$

$$\Delta \text{STORAGE} / \Delta \text{TIME} = 10.5\ H^{1/2}\ (1/43560\ \text{FT}^3/\text{AF})(3600\ \text{SEC/HR})$$

$$\Delta \text{TIME} = \Delta \text{STORAGE} / 0.868\ H^{1/2}$$

Σ TIME TO DRAIN = 105.2 hrs / 24 hr/DAY = 4.4 DAYS

[1] ASSUMES 1) NO INFLOWS TO LAKE
2) NO TAILWATER EFFECTS

RBE 790130 | SKYLINE LAKE NO. 1 | 302-03

DRAWDOWN CALCULATION[1]

ELEV. (FT)	STO. (AF)	Δ STO (AF)	MEAN HEAD (FT)	Δ TIME (HR)	Σ TIME HRS
268.2	85				
		40	9.3	15.1	
265	45				15.1
		40	5.2	20.2	
260	5				35.3
		5	1.35	5.0	
257.3	0				40.3

20" PIPE AND GATE VALVE

USE ORIFICE EQUATION

$$Q = CA\sqrt{2gH}$$

ASSUME $C = 0.6$

$$Q = 0.6\left(\frac{\pi}{4}\left(\frac{20}{12}\right)^2\right)\sqrt{2gH}$$

$$\frac{\Delta \text{STORAGE}}{\Delta \text{TIME}} = 10.5\,H^{1/2}\ (1/43560\ \text{FT}^3/\text{AF})\ (3600\ \text{SEC/HR})$$

$$\Delta \text{TIME} = \Delta \text{STORAGE} / 0.868\,H^{1/2}$$

Σ TIME TO DRAIN = 40.3 HR / 24 HR/DAY = 1.7 DAYS

[1] ASSUMES, 1) NO INFLOWS TO LAKE
2) NO TAILWATER EFFECTS

No Breach

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  23 SEP 78
**********
    1          A1       NEW JERSEY DAM SAFETY - SKYLINE NO. 1 & 2, I.D. NO. 00293 & 00200
    2          A2       HYDRAULIC-HYDROLOGIC ANALYSIS   302-02
    3          A3       PROBABLE MAXIMUM FLOOD                              -RBE-
    4          B   144       0      10       0       0       0       0       0       0
    5          B1    5
    6          J     1       4       1
    7          J1 0.19    0.79     3.5     1.0
    8          K     0       1                                       1
    9          K1       RUNOFF FROM AREA ABOVE SKYLINE LAKE NO. 2
   10          M     1       2     2.8               2.8
   11          P            22.0     112     123     133
   12          T                                                   1.0    0.10
   13          W2          1.0
   14          K    -1     -.05     2.0
   15          K     1       2                                       1
   16          K1                     ROUTED FLOWS THROUGH SKYLINE 2
   17          Y                                 1       1
   18          Y1    1                                             330
   19          S5    0      10      70     170     330     415     525     670
   20          SE 245.9     250     260     270   280.3     285     290     295
   21          S9 280.3      96     2.6     1.5
   22          SJ 284.3     2.6     1.5     180
   23          K     1       3                                       1
   24          K1               ROUTED FLOWS THROUGH SKYLINE 1
   25          Y                                 1       1
   26          Y1    1                                              85
   27          S5    0       5      45      85     110     195     290
   28          SE 257.3     240     265   268.2     270     275     280
   29          S8 264.2      90     3.5     1.5
   30          SD 272.2     2.6     1.5     160
   31          K     1       4                                       1
   32          K1       CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4
   33          Y                                 1       1
   34          Y1    1
   35          Y5  0.1   0.045     3.1     257     293     150    .306
   36          Y7    0      90     150     250     496     261     303     297     925     297
   37          Y7  935     261     700     280    1150     290
   38          K     1       5                                       1
   39          K1       CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5
   40          Y                                 1       1
   41          Y1    1
   42          Y6 0.045   0.045   0.045     250     280    2250   0.004
   43          Y7    0      90    1300     260    1150     253    1150     250    1175     250
   44          Y7 1175     253    1300     260    1600     280
   45          K    99
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
ROUTE HYDROGRAPH TO	4
ROUTE HYDROGRAPH TO	5
END OF NETWORK	

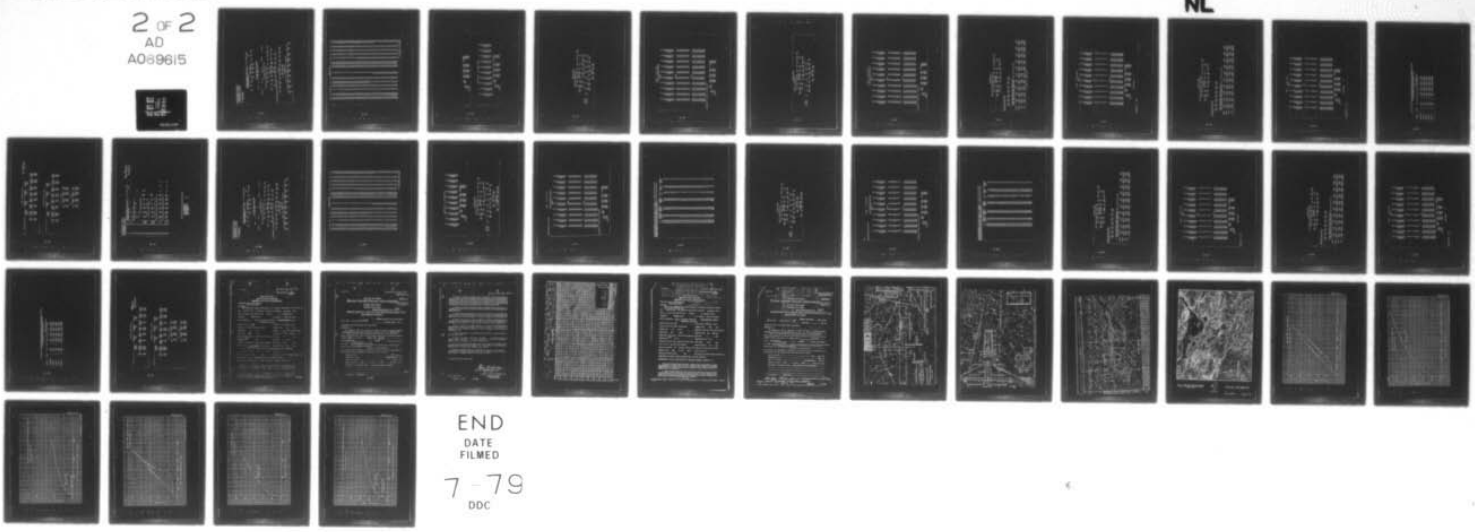
D-13

AD-A069 615 NEW JERSEY STATE DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/2
NATIONAL DAM SAFETY PROGRAM. SKYLINE LAKE DAM NUMBER 2 (NJ00200--ETC(U)
MAY 79 R J JENNY
DACW61-78-C-0124

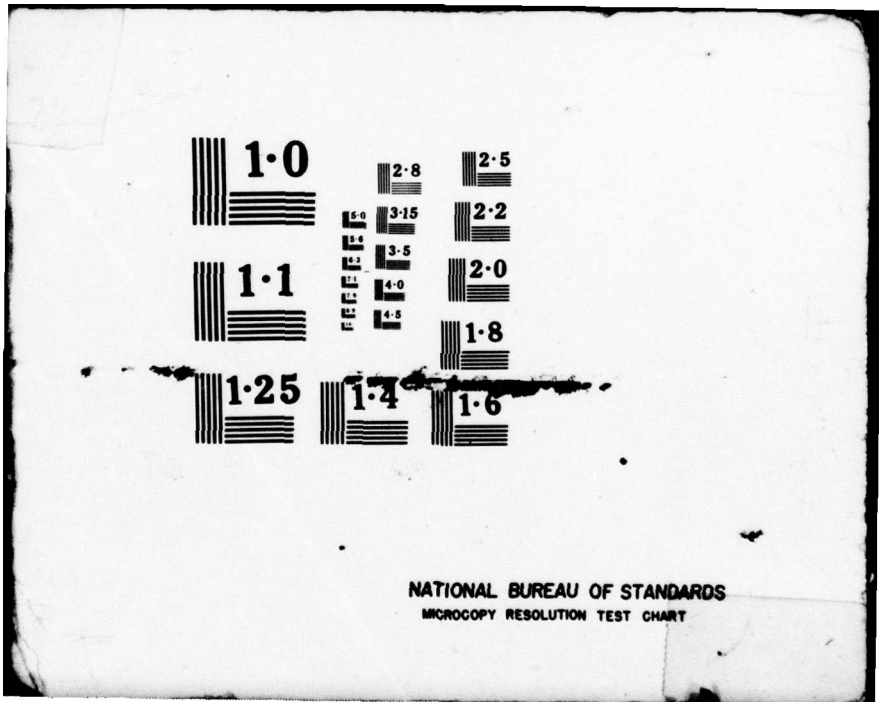
UNCLASSIFIED

NL

2 OF 2
AD
A069615



END
DATE
FILMED
7-79
DDC


1·0
1·1
1·25
2·8
3·15
3·5
4·0
4·5
5·0
2·5
2·2
2·0
1·8
1·4
1·6
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  25 SEP 78
**********

RUN  DATE= 01/24/79
     TIME= 15.37.22.

                NEW JERSEY DAM SAFETY - SKYLINE NO. 1 & 2, I.D. NO. 00203 & 00200
                HYDRAULIC-HYDROLOGIC ANALYSIS  302-03                    -ROF-
                PROBABLE MAXIMUM FLOOD

                                  JOB SPECIFICATION
      NO     NMN     MAIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
     144       0      10       0       0       0       0       0       0       0
                                JOPER     NWT   LROPT   TRACE
                                    5       0       0       0

                             MULTI-PLAN ANALYSES TO BE PERFORMED
                               NPLAN= 1 NRATIO= 4 LRTIO= 1
                RTIOS=    .15    .25    .50   1.00

**********  **********  **********  **********  **********

                                SUB-AREA RUNOFF COMPUTATION

                RUNOFF FROM AREA ABOVE SKYLINE LAKE NO. 2

                          ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT    INAME   ISTAGE   IAUTO
                              1       0       0       0      0       0       1        0       0

                                  HYDROGRAPH DATA
                    IHYDG    IUHG   TAREA    SNAP   IRSDA   IRSPC   RATIO   ISHOW   ISAME   LOCAL
                        1       2    2.00    0.00    2.00    0.00   0.000       0       0       0

                                    PRECIP DATA
                           SPFE     PMS      R6     R12     R24     R48     R72     P96
                           0.00   22.00  112.00  123.00  133.00    0.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS  .800

                                    LOSS DATA
                LROPT   STRTL   CNSTL   ALSMX   RTIMP   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                    0    0.00    0.00    1.00    0.00    0.00    1.00    1.00     .10    0.00    0.00

                                UNIT HYDROGRAPH DATA
                           TC=  0.00    LAG=  1.00

                                RECESSION DATA
                           STRTQ=   -1.00    QRCSN=   -.05    RTIOR= 2.00

     UNIT HYDROGRAPH 32 END OF PERIOD ORDINATES, TC=    0.00 HOURS, LAG=   1.00  VOL= 1.00
      84.     249.     510.     655.    1119.    1239.    1239.    1134.     980.     791.
     584.     452.     349.     270.     210.     160.     131.     102.      79.      61.
      46.      37.      29.      23.      18.      14.      11.       9.       7.       5.
       3.       1.

                                                                                    D-14
```

END-OF-PERIOD FLOW

O MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.10	1	.02	0.00	.02	0.	1.01	12.10	73	.33	.31	.02	423.
1.01	.20	2	.02	0.00	.02	0.	1.01	12.20	74	.33	.31	.02	494.
1.01	.30	3	.02	0.00	.02	0.	1.01	12.30	75	.33	.31	.02	634.
1.01	.40	4	.02	0.00	.02	0.	1.01	12.40	76	.31	.31	.02	840.
1.01	.50	5	.02	0.00	.02	0.	1.01	12.50	77	.33	.31	.02	1176.
1.01	1.00	6	.02	0.00	.02	0.	1.01	13.00	78	.31	.31	.02	1516.
1.01	1.10	7	.02	0.00	.02	0.	1.01	13.10	79	.33	.30	.02	1902.
1.01	1.20	8	.02	0.00	.02	0.	1.01	13.20	80	.30	.30	.02	2140.
1.01	1.30	9	.02	0.00	.02	0.	1.01	13.30	81	.30	.30	.02	2495.
1.01	1.40	10	.02	0.00	.02	0.	1.01	13.40	82	.30	.30	.02	2789.
1.01	1.50	11	.02	0.00	.02	0.	1.01	13.50	83	.30	.30	.02	3003.
1.01	2.00	12	.02	0.00	.02	0.	1.01	14.00	84	.30	.30	.02	3209.
1.01	2.10	13	.02	0.00	.02	0.	1.01	14.10	85	.49	.48	.02	3396.
1.01	2.20	14	.02	0.00	.02	0.	1.01	14.20	86	.49	.48	.02	3570.
1.01	2.30	15	.02	0.00	.02	0.	1.01	14.30	87	.49	.48	.02	3745.
1.01	2.40	16	.02	0.00	.02	0.	1.01	14.40	88	.49	.48	.02	3927.
1.01	2.50	17	.02	0.00	.02	0.	1.01	14.50	89	.49	.48	.02	4112.
1.01	3.00	18	.02	0.00	.02	0.	1.01	15.00	90	.49	.48	.02	4292.
1.01	3.10	19	.02	0.00	.02	0.	1.01	15.10	91	.45	.43	.02	4455.
1.01	3.20	20	.02	0.00	.02	0.	1.01	15.20	92	.75	.73	.02	4616.
1.01	3.30	21	.02	0.00	.02	0.	1.01	15.30	93	1.35	1.33	.02	4846.
1.01	3.40	22	.02	0.00	.02	0.	1.01	15.40	94	3.37	3.35	.02	5379.
1.01	3.50	23	.02	0.00	.02	0.	1.01	15.50	95	.97	.96	.02	6267.
1.01	4.00	24	.02	0.00	.02	0.	1.01	16.00	96	.60	.58	.02	7521.
1.01	4.10	25	.02	0.00	.02	0.	1.01	16.10	97	.46	.44	.02	8955.
1.01	4.20	26	.02	0.00	.02	0.	1.01	16.20	98	.46	.44	.02	10142.
1.01	4.30	27	.02	0.00	.02	0.	1.01	16.30	99	.46	.44	.02	10562.
1.01	4.40	28	.02	0.00	.02	0.	1.01	16.40	100	.46	.44	.02	10563.
1.01	4.50	29	.02	0.00	.02	0.	1.01	16.50	101	.46	.44	.02	10079.
1.01	5.00	30	.02	0.00	.02	0.	1.01	17.00	102	.46	.44	.02	9317.
1.01	5.10	31	.02	0.00	.02	0.	1.01	17.10	103	.36	.34	.02	8421.
1.01	5.20	32	.02	0.00	.02	0.	1.01	17.20	104	.36	.34	.02	7523.
1.01	5.30	33	.02	0.00	.02	0.	1.01	17.30	105	.36	.34	.02	6843.
1.01	5.40	34	.02	0.00	.02	0.	1.01	17.40	106	.36	.34	.02	6293.
1.01	5.50	35	.02	0.00	.02	0.	1.01	17.50	107	.36	.34	.02	5829.
1.01	6.00	36	.02	0.00	.02	0.	1.01	18.00	108	.36	.34	.02	5421.
1.01	6.10	37	.05	0.00	.05	0.	1.01	18.10	109	.03	.01	.02	5062.
1.01	6.20	38	.05	0.00	.05	0.	1.01	18.20	110	.03	.01	.02	4672.
1.01	6.30	39	.05	0.00	.05	0.	1.01	18.30	111	.03	.01	.02	4273.
1.01	6.40	40	.05	0.00	.05	0.	1.01	18.40	112	.03	.01	.02	3882.
1.01	6.50	41	.05	0.00	.05	0.	1.01	18.50	113	.03	.01	.02	3491.
1.01	7.00	42	.05	.02	.04	2.	1.01	19.00	114	.03	.01	.02	2771.
1.01	7.10	43	.05	.04	.02	4.	1.01	19.10	115	.03	.01	.02	2274.
1.01	7.20	44	.05	.04	.02	22.	1.01	19.20	116	.03	.01	.02	1836.
1.01	7.30	45	.05	.04	.02	47.	1.01	19.30	117	.03	.01	.02	1453.
1.01	7.40	46	.05	.04	.02	84.	1.01	19.40	118	.03	.01	.02	1150.
1.01	7.50	47	.05	.04	.02	127.	1.01	19.50	119	.03	.01	.02	929.
1.01	8.00	48	.05	.04	.02	173.	1.01	20.00	120	.03	.01	.02	753.
1.01	8.10	49	.05	.04	.02	217.	1.01	20.10	121	.03	.01	.02	619.
1.01	8.20	50	.05	.04	.02	257.	1.01	20.20	122	.03	.01	.02	521.
1.01	8.30	51	.05	.04	.02	290.	1.01	20.30	123	.03	.01	.02	486.
1.01	8.40	52	.05	.04	.02	315.	1.01	20.40	124	.03	.01	.02	454.
1.01	8.50	53	.05	.04	.02	335.	1.01	20.50	125	.03	.01	.02	423.
1.01	9.00	54	.05	.04	.02	353.	1.01	21.00	126	.03	.01	.02	395.
1.01	9.10	55	.05	.04	.02	361.	1.01	21.10	127	.03	.01	.02	369.
1.01	9.20	56	.05	.04	.02	370.	1.01	21.20	128	.03	.01	.02	344.
1.01	9.30	57	.05	.04	.02	378.	1.01	21.30	129	.03	.01	.02	321.
1.01	9.40	58	.05	.04	.02	388.	1.01	21.40	130	.03	.01	.02	299.
1.01	9.50	59	.05	.04	.02	387.	1.01	21.50	131	.03	.01	.02	279.
1.01	10.00	60	.05	.04	.02	391.	1.01	22.00	132	.03	.01	.02	261.
1.01	10.10	61	.05	.04	.02	393.	1.01	22.10	133	.03	.01	.02	243.
1.01	10.20	62	.05	.04	.02	395.	1.01	22.20	134	.03	.01	.02	227.
1.01	10.30	63	.05	.04	.02	397.	1.01	22.30	135	.03	.01	.02	212.
1.01	10.40	64	.05	.04	.02	398.	1.01	22.40	136	.03	.01	.02	197.
1.01	10.50	65	.05	.04	.02	399.	1.01	22.50	137	.03	.01	.02	184.
1.01	11.00	66	.05	.04	.02	400.	1.01	23.00	138	.03	.01	.02	172.
1.01	11.10	67	.05	.04	.02	401.	1.01	23.10	139	.03	.01	.02	160.
1.01	11.20	68	.05	.04	.02	401.	1.01	23.20	140	.03	.01	.02	150.
1.01	11.30	69	.05	.04	.02	401.	1.01	23.30	141	.03	.01	.02	140.
1.01	11.40	70	.05	.04	.02	402.	1.01	23.40	142	.03	.01	.02	131.
1.01	11.50	71	.05	.04	.02	402.	1.01	23.50	143	.03	.01	.02	123.
1.01	12.00	72	.05	.04	.02	402.	1.02	0.00	144	.03	.01	.02	117.
									SUM	23.41	20.70	2.71	224997.
										(595.1(	525.9(	69.1(	6380.37)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	16942.	5429.	1561.	1561.	224836.
CMS	239.	154.	44.	44.	6366.
INCHES		18.04	20.75	20.75	20.75
MM		458.12	527.01	527.01	527.01
AC-FT		2692.	3097.	3097.	3097.
THOUS CU M		3321.	3820.	3820.	3820.

D-16

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

3.	2.	2.	2.	2.	2.	2.	2.	2.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	7.	9.	22.	47.	94.	127.	173.	247.	257.
290.	315.	339.	350.	361.	370.	376.	383.	387.	391.
393.	396.	397.	398.	399.	400.	401.	411.	411.	412.
412.	412.	425.	494.	634.	869.	1176.	1516.	1962.	2496.
2945.	2740.	3[illegible].	3[illegible].	5394.	3575.	3745.	3927.	4112.	4292.
4455.	4616.	4[illegible].	5379.	6267.	7521.	8955.	10142.	10542.	10503.
10029.	9317.	8421.	7523.	6443.	5429.	5429.	5429.	5429.	5429.
4276.	3902.	3291.	2771.	2276.	1839.	1453.	1150.	929.	753.
618.	521.	456.	456.	423.	302.	369.	344.	321.	299.
279.	261.	243.	227.	212.	197.	184.	172.	163.	156.
146.	137.	137.	137.						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10542.	5429.	1561.	1561.	224836.
CMS	299.	154.	44.	44.	6366.
INCHES		18.04	20.75	20.75	20.75
MM		458.12	527.01	527.01	527.01
AC-FT		2692.	3097.	3097.	3097.
THOUS CU M		3321.	3820.	3820.	3820.

L1-D

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH SKYLINE 2

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	330.	0

CAPACITY=	0.	10.	70.	170.	330.	415.	529.	670.
ELEVATION=	249.	250.	260.	270.	283.	285.	290.	295.

CREL	SPVOL	COOM	EXPV	ELEVL	COOL	CAREA	EXPL
240.3	50.0	2.6	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
284.3	2.6	1.5	100.

STATION 2, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	2.	5.	10.	20.	34.	54.
79.	107.	136.	166.	195.	222.	247.	274.	292.	308.
323.	336.	347.	357.	365.	371.	377.	382.	385.	388.
391.	393.	397.	400.	446.	504.	619.	783.	1067.	1434.
1902.	2290.	2618.	2819.	3159.	3361.	3551.	3737.	3926.	4116.
4288.	4458.	4646.	4873.	5583.	6556.	7856.	9171.	10693.	10427.
10314.	9749.	9033.	8162.	7397.	6756.	6227.	5781.	5381.	5006.
4631.	4222.	3770.	3242.	2816.	2349.	1969.	1629.	1321.	1106.
981.	878.	787.	713.	656.	598.	552.	509.	472.	439.
410.	342.	358.	335.	314.	294.	276.	259.	243.	229.
215.	203.	192.	184.						

STORAGE

330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	331.	331.	332.	333.	335.	337.	340.
343.	346.	349.	351.	354.	356.	358.	359.	361.	362.
363.	364.	365.	365.	366.	366.	367.	367.	367.	368.
368.	368.	368.	369.	371.	375.	381.	390.	401.	412.
421.	429.	436.	439.	442.	445.	449.	454.	459.	456.
458.	461.	463.	467.	475.	486.	500.	514.	523.	527.
525.	520.	513.	504.	495.	488.	482.	477.	472.	469.
463.	458.	451.	444.	437.	430.	423.	416.	410.	404.
400.	395.	392.	388.	383.	380.	377.	375.	373.	371.
369.	367.	366.	364.	363.	361.	360.	359.	357.	356.
355.	354.	353.	353.						

STAGE

280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3
280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3
280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3
280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3	280.3
280.3	280.3	280.3	280.3	280.4	280.4	280.5	280.6	280.7	280.9
281.0	281.2	281.3	281.5	281.6	281.7	281.8	281.9	282.0	282.1
282.1	282.2	282.2	282.3	282.3	282.3	282.3	282.3	282.4	282.4
282.4	282.4	282.4	282.4	282.5	282.6	283.1	283.6	284.2	284.8
285.3	285.8	286.3	286.1	285.2	286.4	286.5	286.6	286.7	286.9
287.0	287.1	287.2	287.4	287.7	288.2	288.9	289.5	289.9	290.1
290.0	289.8	289.6	289.0	288.7	288.3	288.1	287.9	287.6	287.4
287.2	286.9	286.7	286.3	286.0	285.7	285.3	285.0	284.7	284.4
284.1	283.9	283.6	283.4	283.2	283.1	282.9	282.8	282.7	282.6
282.4	282.4	282.3	282.2	282.1	282.0	282.0	281.9	281.8	281.8
281.7	281.6	281.6	281.6						

PEAK OUTFLOW IS 10427. AT TIME 16.67 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10427.	9407.	1550.	1550.	223176.
CMS	295.	133.	44.	44.	6320.
INCHES		17.96	20.60	20.60	20.60
MM		456.25	523.13	523.13	523.13
AC-FT		2681.	3074.	3074.	3074.
THOUS CU M		3307.	3792.	3792.	3792.

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HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH SKYLINE 1

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.30	1	1	0	0		0

	NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	85.	0

CAPACITY=	0.	4.	49.	85.	110.	195.	290.
ELEVATION=	237.	240.	265.	268.	270.	275.	280.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
268.2	30.0	3.?	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
272.2	2.6	1.5	160.

STATION 3, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	1.	3.	6.
11.	20.	33.	51.	72.	98.	125.	154.	183.	210.
236.	260.	282.	300.	317.	331.	343.	353.	361.	368.
374.	379.	384.	389.	399.	421.	456.	519.	622.	795.
1068.	1428.	1880.	2491.	2867.	3147.	3374.	3576.	3769.	3940.
4166.	4325.	4506.	4751.	5179.	5879.	6960.	8273.	9463.	10173.
10350.	10090.	9483.	8715.	7917.	7207.	6614.	6118.	5689.	5300.
4919.	4520.	4139.	3663.	3209.	2769.	2362.	2005.	1697.	1451.
1302.	1176.	1062.	962.	875.	798.	732.	673.	622.	576.
535.	498.	465.	435.	404.	375.	349.	327.	305.	287.
270.	256.	240.	227.						

STORAGE

85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	86.	86.
87.	88.	90.	91.	93.	96.	96.	98.	99.	101.
102.	103.	104.	105.	108.	108.	107.	107.	109.	109.
108.	108.	109.	109.	109.	113.	112.	115.	119.	126.
138.	149.	159.	166.	171.	174.	177.	179.	182.	186.
198.	198.	198.	192.	198.	204.	213.	227.	233.	244.
249.	243.	238.	231.	224.	217.	211.	206.	202.	198.
194.	190.	185.	180.	175.	170.	164.	159.	154.	149.
144.	140.	136.	132.	129.	126.	124.	121.	119.	117.
115.	114.	112.	111.	109.	108.	107.	106.	105.	104.
104.	103.	102.	102.						

STAGE

268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2
268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2
268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2
268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2
268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.2	268.3	268.3
268.4	268.4	268.5	268.6	268.8	268.9	269.0	269.1	269.2	269.3
269.4	269.5	269.6	269.6	269.7	269.7	269.8	269.8	269.9	269.8
269.9	269.9	269.9	269.9	269.9	270.0	270.1	270.3	270.5	270.9
271.5	272.2	272.9	273.3	273.6	273.9	273.9	274.1	274.2	274.3
274.5	274.6	274.7	274.8	275.1	275.5	276.0	276.7	277.2	277.6
277.6	277.5	277.2	276.9	276.5	276.2	275.9	275.6	275.4	275.1
274.9	274.7	274.6	274.1	273.8	273.5	273.2	272.9	272.6	272.3
272.0	271.9	271.5	271.3	271.1	271.0	270.8	270.7	270.5	270.4
270.3	270.2	270.1	270.0	269.9	269.9	269.8	269.7	269.7	269.6
269.5	269.5	269.4	269.4						

PEAK OUTFLOW IS 10350. AT TIME 16.83 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10350.	5380.	1941.	1941.	221970.
CMS	293.	152.	44.	44.	6285.
INCHES		17.80	20.48	20.48	20.48
MM		454.03	520.31	520.31	520.31
AC-FT		2666.	3057.	3057.	3057.
THOUS CU M		3291.	3771.	3771.	3771.

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVT	ELMAX	RLNTH	SEL
.1000	.0450	.1000	257.0	298.0	150.	.00600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 296.00 150.00 280.00 490.00 261.00 500.00 257.00 525.00 257.00
535.00 261.00 700.00 280.00 1150.00 290.00

STORAGE	0.00	.10	.40	.74	1.34	2.21	3.36	4.79	6.58	8.48
	10.73	13.26	16.07	19.16	22.62	26.69	31.39	36.71	42.65	49.22
OUTFLOW	0.00	178.02	578.68	1318.83	2444.42	4058.91	6289.49	8992.66	12460.11	16699.98
	21749.93	27675.71	34535.41	42303.81	50217.17	59585.72	70756.67	83744.02	98636.58	115541.96
STAGE	297.00	298.74	260.47	262.21	263.95	265.68	267.42	269.16	270.89	272.63
	274.37	276.11	277.84	279.58	281.32	283.05	284.79	286.53	288.26	290.00
FLOW	0.00	178.02	578.68	1318.83	2444.42	4058.91	6289.49	8992.66	12460.11	16699.98
	21749.93	27675.71	34535.41	42303.81	50217.17	59585.72	70756.67	83744.02	98636.58	115541.96

STATION 4, PLAN 1, RTIO 1

STATION 4, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	19.	32.	49.	71.	98.	128.	162.	191.	216.
235.	260.	281.	330.	316.	331.	362.	393.	361.	368.
374.	379.	384.	399.	399.	420.	454.	516.	617.	709.
1037.	1497.	1951.	2479.	2850.	3141.	3362.	3571.	3759.	3954.
4197.	4329.	4497.	4746.	5153.	5647.	6011.	6224.	6421.	10159.
10351.	10098.	9509.	8746.	7966.	7231.	6634.	6135.	5765.	5314.
4934.	4535.	4121.	3681.	3227.	2786.	2377.	2018.	1708.	1461.
1260.	1180.	1066.	966.	877.	801.	733.	675.	623.	577.
537.	499.	466.	436.	406.	376.	350.	327.	307.	288.
271.	255.	240.	227.						

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	2.	2.	2.	2.	2.	2.
2.	2.	2.	3.	3.	3.	4.	4.	5.	5.
5.	4.	5.	5.	4.	4.	4.	3.	3.	3.
3.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.						

STAGE

257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.1
257.1	257.2	257.3	257.5	257.7	258.0	258.3	258.6	258.9	259.9
259.0	259.1	259.2	259.3	259.5	259.6	259.8	259.9	259.9	259.9
259.9	259.9	259.9	259.9	259.9	259.8	259.9	260.2	260.6	261.0
261.6	262.4	263.2	264.0	264.6	264.7	264.9	265.2	265.4	265.6
265.8	265.9	266.0	266.2	266.6	267.1	267.9	268.7	269.4	269.7
269.8	269.7	269.6	269.0	268.3	268.1	267.7	267.4	267.0	266.7
266.4	266.1	265.7	265.1	264.6	264.3	263.6	263.3	262.8	262.4
262.2	261.9	261.6	261.4	261.2	261.0	260.8	260.7	260.6	260.5
260.3	260.1	260.0	259.9	259.7	259.6	259.5	259.4	259.3	259.2
259.2	259.1	259.0	259.0						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10351.	5381.	1541.	1541.	221955.
CMS	293.	152.	44.	44.	6285.
INCHES		17.88	20.48	20.48	20.48
MM		454.05	520.27	926.27	926.27
AC-FT		2660.	3057.	3057.	3057.
THOUS CU M		3281.	3771.	3771.	3771.

MAXIMUM STORAGE = 9.

MAXIMUM STAGE IS 269.0

HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

ONE(1)	ONE(2)	ONE(3)	ELMAX	ELMAX	ELMIN	SEL
.0450	.0450	.0450	290.0	280.0	225.0	.00400

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 240.00 1000.00 260.00 1150.00 253.00 1150.00 250.00 1175.00 250.00
1175.00 290.00 1900.00 280.00 1400.00 280.00

STORAGE	0.00	2.94	6.10	9.18	19.31	34.50	54.75	80.00	119.03	157.64
	208.61	267.99	335.67	411.75	496.21	589.03	690.23	799.79	917.73	1044.03
OUTFLOW	0.00	109.94	303.50	719.86	1611.79	3208.02	5692.45	9014.95	13746.53	20255.16
	28773.64	39534.49	52761.81	68671.13	87469.97	109358.67	134531.24	163176.02	195476.32	231610.85
STAGE	250.00	251.50	253.16	254.74	256.31	257.89	259.47	261.05	262.63	264.21
	265.79	267.37	261.95	270.53	272.11	273.68	275.26	276.84	278.42	280.00
FLOW	0.00	109.94	306.50	719.86	1611.79	3208.02	5692.85	9014.95	13746.53	20255.06
	28773.64	39534.49	52761.81	68671.13	87469.97	109358.67	134531.24	163176.02	195476.32	231610.85

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STATION 5, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	3.	0.
0.	0.	0.	0.	0.	0.	0.	0.	3.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	3.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	3.
5.	10.	18.	30.	45.	65.	88.	119.	159.	180.
216.	241.	265.	285.	304.	318.	331.	343.	353.	361.
368.	374.	379.	394.	391.	404.	428.	469.	539.	636.
854.	1140.	1547.	2101.	2574.	2928.	3203.	3444.	3646.	3839.
4028.	4212.	4392.	4634.	4918.	5451.	6314.	7426.	8736.	9752.
10242.	10229.	9813.	9144.	8392.	7641.	6979.	6423.	5952.	5541.
5153.	4771.	4365.	3940.	3495.	3061.	2658.	2271.	1928.	1640.
1443.	1292.	1184.	1052.	958.	867.	792.	726.	673.	620.
573.	534.	497.	464.	433.	403.	375.	349.	326.	305.
284.	267.	251.	237.						

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	2.	2.	3.	3.
3.	3.	4.	4.	4.	4.	4.	5.	5.	5.
5.	5.	5.	5.	5.	5.	6.	6.	7.	8.
11.	14.	19.	24.	28.	32.	34.	36.	33.	40.
41.	43.	44.	46.	48.	51.	60.	69.	79.	88.
90.	90.	87.	82.	76.	70.	65.	60.	57.	54.
50.	47.	44.	40.	37.	33.	29.	26.	22.	26.
17.	16.	14.	13.	12.	11.	10.	9.	9.	8.
7.	7.	6.	6.	6.	5.	5.	5.	4.	4.
4.	4.	4.	3.						

STAGE

250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.1	250.1	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.1	250.2	250.3	250.5	250.7	251.0	251.3	251.7	252.0	252.2
252.4	252.6	252.8	253.0	253.1	253.2	253.2	253.3	253.3	253.4
253.4	253.4	253.4	253.4	253.5	253.5	253.6	253.6	254.0	254.0
254.1	254.3	256.2	256.5	257.3	257.6	257.9	258.0	258.2	258.3
259.4	259.5	259.6	259.8	259.0	259.3	259.8	260.3	260.9	261.3
261.5	261.5	261.3	261.1	260.8	260.4	260.1	259.8	259.6	259.4
259.1	258.9	258.8	258.6	258.1	257.7	257.4	257.0	256.6	256.3
256.0	255.8	255.5	255.3	255.2	255.0	254.9	254.7	254.6	254.4
254.2	254.0	253.9	253.8	253.6	253.5	253.4	253.3	253.2	253.1
253.0	252.9	252.7	252.6						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10262.	9373.	1540.	1540.	221769.
CMS	290.	152.	44.	44.	6278.
INCHES		17.85	20.46	20.46	20.46
MM		453.41	519.69	519.69	519.69
AC-FT		2064.	3054.	3054.	3054.
THNHS CU M		3286.	3767.	3767.	3767.

MAXIMUM STORAGE = 90.

MAXIMUM STAGE IS 261.5

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS			
				RATIO 1 .15	RATIO 2 .25	RATIO 3 .50	RATIO 4 1.00
HYDROGRAPH AT	1	2.80	1	1541.	2635.	5271.	10542.
	(	7.25)	(	44.76)(	74.63)(	149.26)(	298.52)(
ROUTED TO	2	2.80	1	1468.	2546.	5103.	10427.
	(	7.25)	(	41.96)(	72.09)(	144.28)(	295.29)(
ROUTED TO	3	2.80	1	1326.	2484.	5113.	10350.
	(	7.25)	(	37.36)(	70.33)(	144.78)(	293.07)(
ROUTED TO	4	2.80	1	1320.	2494.	5111.	10351.
	(	7.25)	(	37.34)(	70.35)(	144.74)(	293.10)(
ROUTED TO	5	2.80	1	1305.	2453.	5077.	10242.
	(	7.25)	(	36.95)(	69.46)(	143.76)(	290.03)(

No BREACH

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	280.30	290.30	294.30
STORAGE	330.	330.	402.
OUTFLOW	0.	0.	1040.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.15	294.07	.37	513.	1460.	1.33	16.83	0.00
.25	295.41	1.91	432.	2546.	3.33	16.83	0.00
.50	297.49	3.19	470.	5169.	5.67	16.67	0.00
1.00	300.06	5.76	527.	10427.	6.83	16.67	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	268.20	268.20	272.20
STORAGE	85.	85.	147.
OUTFLOW	0.	0.	1409.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.15	272.69	0.00	145.	1320.	0.00	17.33	0.00
.25	273.29	1.09	148.	2484.	2.17	17.00	0.00
.50	275.04	2.84	196.	5113.	4.83	16.83	0.00
1.00	277.64	5.44	249.	10350.	6.50	16.83	0.00

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.15	1320.	262.2	17.33
.25	2484.	264.0	17.00
.50	5111.	266.5	16.83
1.00	10351.	269.8	16.83

PLAN 1 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.15	1939.	255.8	17.50
.25	2453.	257.1	17.17
.50	5077.	259.1	17.00
1.00	10262.	261.9	16.83

Dam Breach Analysis

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
 LAST MODIFICATION  25 SEP 78
**********
    1              A1       NEW JERSEY DAM SAFETY - SKYLINE NO. 1 & 2, I.D. NO. 60203 & 60206
    2              A2       HYDRAULIC-HYDROLOGIC ANALYSIS   382-83
    3              A3       PROBABLE MAXIMUM FLOOD                                          -ROE-
    4              B   144          0        10         0         0         0         0         0         0         0
    5              B1    5
    6              J     1         4         1
    7              J1  0.15     0.25       0.5       1.0
    8              K     0         1                                                    1
    9              K1       RUNOFF FROM AREA ABOVE SKYLINE LAKE NO. 2
   10              M     1         2       2.4                 2.4
   11              P              22.0       112       123       133
   12              T                                                          1.0      0.10
   13              M2                1.0
   14              X    -1        -.05       2.0
   15              K     1         2                                                    1
   16              K1                       ROUTED FLOWS THROUGH SKYLINE 2
   17              Y                                          1         1
   18              Y1    1                                                            330
   19              S5    0        10        70       170       330       415       525       670
   20              SE 245.3       253       260       270     280.3       285       290       295
   21              S1 280.3        50       2.6       1.5
   22              S0 284.3       2.6       1.5       140
   23              S0   140         0     262.8         3     280.3     284.3
   24              K     1         3                                                    1
   25              K1                       ROUTED FLOWS THROUGH SKYLINE 1
   26              Y                                          1         1
   27              Y1    1                                                             85
   28              S5    0         5        45        85       110       195       290
   29              SE 257.3       260       265     260.2       270       275       280
   30              S1 260.2        50       3.5       1.5
   31              S0 272.2       2.6       1.5       160
   32              S9   160         0     259.3         1     260.2     272.2
   33              K     1         4                                                    1
   34              K1               CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4
   35              Y                                          1         1
   36              Y1    1
   37              Y6  0.1     0.045       0.1       257       298       158      .006
   38              Y7    0       298       150       280       490       261       580       257       525       257
   39              Y7  535       261       700       240      1150       298
   40              K     1         5                                                    1
   41              K1               CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4
   42              Y                                          1         1
   43              Y1    1
   44              Y6  0.045     0.045     0.045       258       288      2250     0.006
   45              Y7    0       288      1080       268      1150       293      1150       258      1175       258
   46              Y7 1175       253      1380       268      1688       288
   47              K    99
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

```
 RUNOFF HYDROGRAPH AT          1
 ROUTE HYDROGRAPH TO           2
 ROUTE HYDROGRAPH TO           3
 ROUTE HYDROGRAPH TO           4
 ROUTE HYDROGRAPH TO           5
 END OF NETWORK
```

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1979
  LAST MODIFICATION  25 SEP 79
**********************************

RUN  DATE= 01/25/79
     TIME= 20.56.33.
```

NEW JERSEY DAM SAFETY - SKYLINE NO. 1 + 2, I.D. NO. 00203 + 00200
HYDRAULIC-HYDROLOGIC ANALYSIS 302-33
PROBABLE MAXIMUM FLOOD -SDE-

JOB SPECIFICATION

NO	NWR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
144	0	10	0	0	0	0	0	0	0

JOPER	NUT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1

RTIOS= .15 .25 .50 1.00

SUB-AREA RUNOFF COMPUTATION

RUNOFF FROM AREA ABOVE SKYLINE LAKE NO. 2

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	2.80	0.00	2.80	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	P96
0.00	22.60	112.60	123.60	133.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .000

LOSS DATA

LROPT	STRTQ	STRTK	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= 1.00

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 32 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= 1.00 VOL= 1.00

84.	240.	510.	835.	1119.	1239.	1239.	1134.	989.	791.
584.	452.	349.	279.	218.	168.	131.	102.	79.	61.
46.	37.	29.	23.	18.	14.	11.	9.	7.	5.
3.	1.								

82-0

HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1	.02	0.00	.02	3.
1.01	2	.02	0.00	.02	2.
1.01	3	.02	0.00	.02	2.
1.01	4	.02	0.00	.02	2.
1.01	5	.02	0.00	.02	2.
1.01	6	.02	0.00	.02	2.
1.01	7	.02	0.00	.02	2.
1.01	8	.02	0.00	.02	2.
1.01	9	.02	0.00	.02	2.
1.01	10	.02	0.00	.02	1.
1.01	11	.02	0.00	.02	1.
1.01	12	.02	0.00	.02	1.
1.01	13	.02	0.00	.02	1.
1.01	14	.02	0.00	.02	1.
1.01	15	.02	0.00	.02	1.
1.01	16	.02	0.00	.02	1.
1.01	17	.02	0.00	.02	1.
1.01	18	.02	0.00	.02	1.
1.01	19	.02	0.00	.02	1.
1.01	20	.02	0.00	.02	1.
1.01	21	.02	0.00	.02	1.
1.01	22	.02	0.00	.02	1.
1.01	23	.02	0.00	.02	1.
1.01	24	.02	0.00	.02	1.
1.01	25	.02	0.00	.02	0.
1.01	26	.02	0.00	.02	0.
1.01	27	.02	0.00	.02	0.
1.01	28	.02	0.00	.02	0.
1.01	29	.02	0.00	.02	0.
1.01	30	.02	0.00	.02	0.
1.01	31	.02	0.00	.02	0.
1.01	32	.02	0.00	.02	0.
1.01	33	.02	0.00	.02	0.
1.01	34	.02	0.00	.02	0.
1.01	35	.02	0.00	.02	0.
1.01	36	.02	0.00	.02	0.
1.01	37	.05	0.00	.05	0.
1.01	38	.05	0.00	.05	0.
1.01	39	.05	0.00	.05	0.
1.01	40	.05	0.00	.05	0.
1.01	41	.05	0.00	.05	0.
1.01	42	.05	.02	.04	2.
1.01	43	.05	.04	.02	8.
1.01	44	.05	.04	.02	22.
1.01	45	.05	.04	.02	47.
1.01	46	.05	.04	.02	86.
1.01	47	.05	.04	.02	127.
1.01	48	.05	.04	.02	173.
1.01	49	.05	.04	.02	217.
1.01	50	.05	.04	.02	257.
1.01	51	.05	.04	.02	290.
1.01	52	.05	.04	.02	315.
1.01	53	.05	.04	.02	333.
1.01	54	.05	.04	.02	350.
1.01	55	.05	.04	.02	361.
1.01	56	.05	.04	.02	370.
1.01	57	.05	.04	.02	379.
1.01	58	.05	.04	.02	383.
1.01	59	.05	.04	.02	387.
1.01	60	.05	.04	.02	391.
1.01	61	.05	.04	.02	393.
1.01	62	.05	.04	.02	395.
1.01	63	.05	.04	.02	397.
1.01	64	.05	.04	.02	398.
1.01	65	.05	.04	.02	399.
1.01	66	.05	.04	.02	400.
1.01	67	.05	.04	.02	401.
1.01	68	.05	.04	.02	401.
1.01	69	.05	.04	.02	401.
1.01	70	.05	.04	.02	402.
1.01	71	.05	.04	.02	402.
1.01	72	.05	.04	.02	402.

END-OF-PERIOD FLOW

HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	73	.33	.31	.02	425.
1.01	74	.33	.31	.02	464.
1.01	75	.33	.31	.02	634.
1.01	76	.33	.31	.02	940.
1.01	77	.33	.31	.02	1170.
1.01	78	.33	.31	.02	1510.
1.01	79	.39	.36	.02	1962.
1.01	80	.39	.36	.02	2190.
1.01	81	.39	.36	.02	2495.
1.01	82	.39	.36	.02	2799.
1.01	83	.39	.36	.02	3068.
1.01	84	.39	.36	.02	3268.
1.01	85	.49	.46	.02	3396.
1.01	86	.49	.46	.02	3570.
1.01	87	.49	.46	.02	3765.
1.01	88	.49	.46	.02	3927.
1.01	89	.49	.46	.02	4112.
1.01	90	.49	.46	.02	4292.
1.01	91	.45	.43	.02	4455.
1.01	92	.75	.73	.02	4615.
1.01	93	1.35	1.33	.02	4844.
1.01	94	3.37	3.35	.02	5379.
1.01	95	.47	.46	.02	6287.
1.01	96	.60	.58	.02	7571.
1.01	97	.46	.44	.02	8695.
1.01	98	.46	.44	.02	10042.
1.01	99	.46	.44	.02	10342.
1.01	100	.46	.44	.02	10503.
1.01	101	.46	.44	.02	10529.
1.01	102	.46	.44	.02	9317.
1.01	103	.36	.34	.02	6921.
1.01	104	.36	.34	.02	7528.
1.01	105	.36	.34	.02	6463.
1.01	106	.36	.34	.02	6283.
1.01	107	.36	.34	.02	5428.
1.01	108	.36	.34	.02	5421.
1.01	109	.03	.01	.02	5147.
1.01	110	.03	.01	.02	4672.
1.01	111	.03	.01	.02	4270.
1.01	112	.03	.01	.02	3902.
1.01	113	.03	.01	.02	3241.
1.01	114	.03	.01	.02	2771.
1.01	115	.03	.01	.02	2276.
1.01	116	.03	.01	.02	1836.
1.01	117	.03	.01	.02	1453.
1.01	118	.03	.01	.02	1150.
1.01	119	.03	.01	.02	929.
1.01	120	.03	.01	.02	753.
1.01	121	.03	.01	.02	619.
1.01	122	.03	.01	.02	521.
1.01	123	.03	.01	.02	446.
1.01	124	.03	.01	.02	404.
1.01	125	.03	.01	.02	423.
1.01	126	.03	.01	.02	395.
1.01	127	.03	.01	.02	369.
1.01	128	.03	.01	.02	344.
1.01	129	.03	.01	.02	321.
1.01	130	.03	.01	.02	299.
1.01	131	.03	.01	.02	279.
1.01	132	.03	.01	.02	261.
1.01	133	.03	.01	.02	243.
1.01	134	.03	.01	.02	227.
1.01	135	.03	.01	.02	212.
1.01	136	.03	.01	.02	197.
1.01	137	.03	.01	.02	184.
1.01	138	.03	.01	.02	172.
1.01	139	.03	.01	.02	160.
1.01	140	.03	.01	.02	150.
1.01	141	.03	.01	.02	140.
1.01	142	.03	.01	.02	131.
1.01	143	.03	.01	.02	122.
1.02	144	.03	.01	.02	114.
	SUM	23.41	20.70	2.71	224997.
		(595.1(	526.1(	69.1(	6368.37)

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

3.	2.	2.	2.	2.	2.	2.	2.	2.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	8.	22.	47.	84.	127.	173.	217.	257.
290.	315.	335.	350.	361.	370.	378.	383.	387.	391.
393.	399.	397.	398.	399.	400.	401.	401.	401.	402.
402.	402.	423.	494.	634.	869.	1176.	1516.	1862.	2190.
2495.	2769.	3003.	3208.	3394.	3570.	3745.	3927.	4112.	4292.
4455.	4616.	4844.	5379.	6267.	7521.	8955.	10042.	10542.	10503.
10020.	9317.	8421.	7523.	6843.	6283.	5820.	5421.	5042.	4672.
4270.	3902.	3591.	2771.	2276.	1834.	1453.	1150.	929.	753.
618.	521.	486.	454.	423.	395.	369.	344.	321.	299.
279.	261.	245.	227.	212.	197.	184.	172.	163.	150.
140.	137.	137.	137.						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10542.	9429.	1961.	1961.	224830.
CMS	299.	154.	44.	44.	6366.
INCHES		18.04	20.79	20.79	20.79
MM		458.12	527.81	527.81	527.81
AC-FT		2692.	3097.	3097.	3097.
THOUS CU M		3321.	3820.	3820.	3820.

D-20

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH SKYLINE 2

ISTAQ	ICONP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	338.	0

CAPACITY=	0.	10.	70.	170.	330.	415.	525.	670.
ELEVATION=	245.	250.	260.	270.	280.	285.	290.	295.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
280.3	50.0	2.6	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
284.3	2.6	1.5	100.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	HSEL	FAILEL
100.	0.00	262.00	3.00	288.30	284.30

STATION 2, PLAN 1, RATIO 4

BEGIN DAM FAILURE AT 13.33 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	2.	5.	10.	20.	34.	54.
79.	107.	136.	166.	195.	222.	247.	270.	290.	308.
323.	336.	347.	357.	365.	371.	377.	382.	385.	388.
391.	393.	397.	409.	448.	504.	615.	763.	1407.	1578.
2774.	3446.	3968.	4304.	4578.	4811.	5265.	5176.	5345.	5525.
5697.	5862.	6059.	6438.	7134.	8199.	9549.	10868.	10414.	10345.
10288.	9566.	8739.	7841.	7002.	6491.	6681.	9582.	5197.	4626.
4444.	4012.	3528.	3022.	2529.	2074.	1676.	1343.	1163.	983.
728.	688.	532.	488.	453.	423.	395.	369.	349.	322.
311.	282.	261.	246.	230.	215.	201.	186.	176.	164.
154.	146.	141.	139.						

STORAGE

330.	335.	330.	330.	330.	330.	330.	330.	330.	333.
330.	330.	330.	330.	330.	333.	330.	333.	330.	330.
330.	330.	330.	330.	330.	332.	330.	334.	336.	330.
330.	329.	330.	330.	330.	330.	330.	330.	330.	340.
330.	329.	330.	331.	331.	332.	333.	335.	337.	340.
343.	346.	349.	351.	354.	356.	358.	359.	361.	362.
361.	364.	365.	365.	366.	366.	367.	367.	367.	366.
364.	361.	360.	369.	371.	375.	381.	390.	401.	411.
419.	426.	334.	388.	366.	340.	330.	313.	296.	279.
261.	244.	227.	212.	199.	189.	180.	171.	169.	169.
160.	165.	161.	156.	153.	150.	147.	145.	142.	140.
130.	135.	132.	129.	126.	122.	119.	116.	114.	112.
110.	109.	108.	107.	107.	106.	106.	106.	105.	105.
105.	104.	104.	104.	104.	103.	103.	103.	103.	102.
102.	102.	102.	102.						

STAGE

240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3
240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3
240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3
240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3	240.3
240.3	240.3	240.3	240.3	240.4	240.4	240.5	240.6	240.7	240.9
241.0	241.2	241.3	241.5	241.6	241.7	241.8	241.9	242.0	242.1
242.1	242.2	242.2	242.3	242.3	242.3	242.3	242.3	242.4	242.4
242.4	242.4	242.4	242.4	242.6	242.8	243.1	243.6	244.2	244.8
244.9	244.5	243.9	243.1	242.2	241.3	243.3	279.2	276.1	277.8
275.9	274.8	273.7	272.7	271.9	271.2	270.7	270.4	269.9	269.9
269.8	269.5	269.1	268.6	268.3	268.0	267.7	267.5	267.2	267.0
266.8	266.5	266.2	265.9	265.6	265.2	264.9	264.6	264.4	264.2
264.0	263.9	263.8	263.7	263.7	263.6	263.6	263.6	263.5	263.5
263.5	263.4	263.4	263.4	263.4	263.3	263.3	263.3	263.3	263.2
263.2	263.2	263.2	263.2						

PEAK OUTFLOW IS 10868. AT TIME 18.33 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10868.	6016.	1677.	1677.	241557.
CMS	306.	170.	48.	48.	6840.
INCHES		19.99	22.29	22.29	22.29
MM		507.66	566.22	566.22	566.22
AC-FT		2983.	3327.	3327.	3327.
THOUS CU M		3680.	4104.	4104.	4104.

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THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .056 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .167 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
13.333	0.000	1570.		1570.		0.	0.	0.
13.389	.056	1972.		2034.		-62.	-62.	-0.
13.444	.111	2374.		2444.		-70.	-132.	-1.
13.500	.167	2776.		2776.		0.	-132.	-1.
13.556	.222	3008.		3041.		-41.	-173.	-1.
13.611	.278	3223.		3258.		-34.	-207.	-1.
13.667	.333	3446.		3446.		0.	-207.	-1.
13.722	.389	3618.		3626.		-8.	-216.	-1.
13.778	.444	3789.		3809.		-20.	-235.	-1.
13.833	.510	3960.		3960.		0.	-235.	-1.
13.889	.556	4075.		4089.		-15.	-256.	-1.
13.944	.611	4189.		4202.		-13.	-262.	-1.
14.000	.667	4304.		4304.		0.	-262.	-1.
14.056	.722	4393.		4398.		-5.	-268.	-1.
14.111	.778	4481.		4486.		-4.	-272.	-1.
14.167	.833	4570.		4570.		0.	-272.	-1.
14.222	.889	4650.		4651.		-1.	-273.	-1.
14.278	.944	4730.		4731.		-1.	-274.	-1.
14.333	1.000	4811.		4811.		0.	-274.	-1.
14.389	1.056	4895.		4891.		4.	-270.	-1.
14.444	1.111	4980.		4974.		6.	-264.	-1.
14.500	1.167	5065.		5065.		0.	-264.	-1.
14.556	1.222	5102.		5093.		12.	-252.	-1.
14.611	1.278	5139.		5128.		10.	-242.	-1.
14.667	1.333	5176.		5176.		0.	-242.	-1.
14.722	1.389	5232.		5229.		3.	-239.	-1.
14.778	1.444	5288.		5246.		3.	-236.	-1.
14.833	1.500	5345.		5345.		0.	-236.	-1.
14.889	1.556	5405.		5405.		0.	-236.	-1.
14.944	1.611	5465.		5465.		0.	-236.	-1.
15.000	1.667	5525.		5525.		0.	-236.	-1.
15.056	1.722	5582.		5584.		-2.	-237.	-1.
15.111	1.778	5640.		5641.		-1.	-239.	-1.
15.167	1.833	5697.		5697.		0.	-239.	-1.
15.222	1.889	5752.		5753.		-0.	-239.	-1.
15.278	1.944	5807.		5864.		-0.	-246.	-1.
15.333	2.000	5862.		5862.		3.	-240.	-1.
15.389	2.056	5924.		5921.		6.	-233.	-1.
15.444	2.111	5993.		5940.		5.	-228.	-1.
15.500	2.167	6059.		6059.		0.	-228.	-1.
15.556	2.222	6185.		6154.		31.	-197.	-1.
15.611	2.278	6312.		6246.		26.	-171.	-1.
15.667	2.333	6438.		6438.		0.	-171.	-1.
15.722	2.389	6670.		6629.		41.	-129.	-1.
15.778	2.444	6902.		6867.		35.	-95.	-0.
15.833	2.593	7134.		7134.		0.	-95.	-0.
15.889	2.556	7489.		7444.		45.	-51.	-0.
15.944	2.611	7844.		7886.		38.	-12.	-0.
16.000	2.667	8199.		8199.		0.	-12.	-0.
16.056	2.722	8649.		8623.		26.	15.	0.
16.111	2.778	9099.		9078.		22.	36.	0.
16.167	2.833	9549.		9549.		0.	36.	0.
16.222	2.889	9969.		10002.		-33.	3.	0.
16.278	2.944	10388.		10415.		-27.	-24.	-0.
16.333	3.000	10808.		10808.		0.	-24.	-0.

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HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH SKYLINE 1

ISTAQ	ICONF	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	65.	0

CAPACITY=	0.	5.	45.	85.	110.	195.	290.
ELEVATION=	297.	260.	265.	260.	270.	275.	280.

CREL	SPWID	COQN	EXPN	ELEVL	COQL	CAREA	EXPL
260.2	50.0	3.5	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
272.2	2.6	1.5	160.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	HSEL	FAILEL
160.	0.00	259.30	1.00	266.20	272.26

OVN

STATION 3, PLAN 1, RATIO 4

BEGIN DAM FAILURE AT 13.67 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	3.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	1.	1.	0.
11.	21.	33.	51.	72.	98.	125.	154.	183.	218.
236.	268.	282.	308.	317.	331.	343.	353.	361.	366.
376.	373.	384.	389.	399.	421.	456.	519.	622.	816.
1752.	2466.	4624.	5674.	6376.	6622.	6695.	7862.	5402.	5448.
9641.	9889.	9963.	6290.	6853.	7666.	8983.	10236.	10033.	10473.
10371.	9861.	9122.	8266.	7452.	6798.	6156.	5726.	5331.	4968.
4547.	4179.	3723.	3231.	2742.	2202.	1678.	1517.	1230.	1055.
838.	693.	592.	526.	493.	449.	419.	392.	366.	341.
321.	300.	273.	248.	235.	218.	235.	191.	179.	167.
156.	150.	144.	140.						

STORAGE

85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	85.	85.
85.	85.	85.	85.	85.	85.	85.	85.	86.	86.
87.	89.	90.	91.	93.	94.	96.	98.	99.	101.
102.	103.	104.	105.	106.	136.	107.	107.	108.	108.
108.	108.	108.	109.	139.	110.	112.	115.	119.	127.
143.	160.	161.	146.	124.	98.	73.	47.	39.	39.
40.	41.	42.	43.	46.	52.	60.	64.	71.	73.
69.	66.	61.	56.	50.	46.	42.	40.	39.	37.
35.	33.	30.	27.	25.	22.	19.	16.	14.	12.
11.	9.	8.	8.	7.	7.	7.	6.	6.	6.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.						

STAGE

260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2
260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2
260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2
260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2
260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.2	260.3	260.3
260.4	260.4	260.5	260.6	260.8	260.9	260.8	269.1	269.2	269.3
269.4	269.5	269.6	269.6	269.7	269.7	269.8	269.8	269.8	269.8
269.9	269.9	269.9	269.9	269.9	270.0	270.1	270.3	270.5	271.6
271.9	273.8	271.8	272.1	270.8	269.2	267.3	265.2	264.2	264.3
264.4	264.5	264.6	264.8	265.1	265.5	266.2	266.9	267.1	267.0
266.9	266.7	266.3	265.9	265.4	265.0	264.7	264.4	264.2	264.0
263.7	263.5	263.1	262.8	262.4	262.1	261.7	261.4	261.1	260.9
260.7	260.6	260.4	260.3	260.3	260.2	260.2	260.2	260.1	260.1
260.1	260.0	260.0	259.9	259.9	259.9	259.9	259.8	259.8	259.8
259.8	259.8	259.7	259.7						

PEAK OUTFLOW IS 10633. AT TIME 16.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10633.	6259.	1719.	1719.	247470.
CMS	301.	177.	49.	49.	7008.
INCHES		23.79	22.84	22.84	22.84
MM		520.17	580.08	580.08	580.08
AC-FT		3184.	3409.	3409.	3409.
THOUS CU M		3928.	4209.	4209.	4209.

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SE-D

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .167 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
13.667	0.000	2486.		2486.		0.	0.	0.
13.688	.021	2643.		2764.		-81.	-81.	-0.
13.708	.042	2960.		3111.		-150.	-231.	-0.
13.729	.063	3238.		3433.		-195.	-427.	-1.
13.750	.083	3515.		3726.		-211.	-638.	-1.
13.771	.104	3792.		3989.		-197.	-835.	-1.
13.792	.125	4070.		4224.		-155.	-990.	-2.
13.813	.146	4347.		4435.		-88.	-1078.	-2.
13.833	.167	4624.		4624.		0.	-1078.	-2.
13.854	.188	4756.		4794.		-38.	-1116.	-2.
13.875	.208	4887.		4945.		-58.	-1174.	-2.
13.896	.229	5018.		5081.		-63.	-1237.	-2.
13.917	.250	5149.		5207.		-58.	-1294.	-2.
13.938	.271	5281.		5325.		-44.	-1339.	-2.
13.958	.292	5412.		5438.		-27.	-1365.	-2.
13.979	.313	5543.		5551.		-8.	-1373.	-2.
14.000	.333	5674.		5674.		0.	-1373.	-2.
14.021	.354	5762.		5793.		-31.	-1405.	-2.
14.042	.375	5850.		5908.		-58.	-1463.	-3.
14.063	.396	5937.		5996.		-58.	-1521.	-3.
14.083	.417	6025.		6083.		-58.	-1579.	-3.
14.104	.437	6117.		6164.		-51.	-1630.	-3.
14.125	.458	6231.		6239.		-38.	-1668.	-3.
14.146	.479	6288.		6309.		-21.	-1689.	-3.
14.167	.500	6376.		6376.		0.	-1689.	-3.
14.188	.521	6407.		6440.		-33.	-1714.	-3.
14.208	.542	6437.		6500.		-63.	-1777.	-3.
14.229	.562	6468.		6559.		-91.	-1868.	-3.
14.250	.583	6499.		6616.		-117.	-1985.	-3.
14.271	.604	6530.		6619.		-90.	-2075.	-4.
14.292	.625	6569.		6606.		-46.	-2120.	-4.
14.313	.646	6591.		6608.		-17.	-2137.	-4.
14.333	.667	6622.		6622.		0.	-2137.	-4.
14.354	.687	6656.		6646.		13.	-2127.	-4.
14.375	.708	6690.		6679.		11.	-2116.	-4.
14.396	.729	6724.		6720.		4.	-2111.	-4.
14.417	.750	6758.		6771.		-13.	-2124.	-4.
14.438	.771	6792.		6809.		-16.	-2141.	-4.
14.458	.792	6827.		6837.		-10.	-2151.	-4.
14.479	.812	6861.		6865.		-5.	-2155.	-4.
14.500	.833	6895.		6895.		0.	-2155.	-4.
14.521	.854	6916.		6923.		-7.	-2162.	-4.
14.542	.875	6937.		6948.		-11.	-2174.	-4.
14.563	.896	6957.		6970.		-13.	-2187.	-4.
14.583	.917	6978.		6991.		-13.	-2199.	-4.
14.604	.937	6999.		7010.		-11.	-2211.	-4.
14.625	.958	7829.		7020.		-6.	-2219.	-4.
14.646	.979	7841.		7045.		-4.	-2223.	-4.
14.667	1.000	7862.		7862.		0.	-2223.	-4.

HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	6	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPAP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QWE(1)	QWE(2)	QWE(3)	ELMVF	ELMAX	PLNTH	SEL
.1500	.0455	.1500	257.0	290.0	150.	.00000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 293.00 150.00 280.60 490.00 261.00 900.00 297.00 925.00 297.00
935.00 261.00 700.10 280.00 1150.00 290.00

STORAGE	0.00	.19	.46	.76	1.14	2.21	3.36	4.79	6.50	8.48
	10.73	13.24	16.07	19.16	22.62	26.69	31.39	36.71	42.65	49.22
OUTFLOW	0.00	179.02	575.60	1310.03	2444.42	4050.91	6209.49	8992.66	12468.11	16699.98
	21749.53	27679.71	34539.41	42383.81	50217.17	59989.72	70756.67	83744.82	98636.50	115541.96
STAGE	257.00	259.74	263.47	267.21	269.95	269.68	267.42	269.16	270.99	272.63
	274.37	276.11	277.84	279.98	281.32	283.05	284.79	286.53	288.26	290.00
FLOW	0.00	179.02	575.60	1310.03	2444.42	4050.91	6209.49	8992.66	12468.11	16699.98
	21749.53	27679.71	34539.41	42383.81	50217.17	59989.72	70756.67	83744.82	98636.50	115541.96

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STATION 4, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	1.	2.	5.
18.	19.	32.	49.	71.	96.	123.	152.	181.	210.
235.	260.	281.	300.	316.	331.	342.	353.	361.	368.
376.	379.	384.	389.	393.	420.	454.	516.	617.	837.
1232.	2341.	4517.	5690.	6312.	6664.	6843.	7095.	5451.	5361.
5694.	5746.	6025.	6246.	6959.	7613.	8868.	1017e.	16ue0.	10430.
10309.	9800.	9155.	8296.	7482.	6889.	6183.	5732.	5352.	4960.
4607.	4191.	3743.	3247.	2764.	2297.	1886.	1524.	1246.	1018.
837.	695.	596.	528.	465.	450.	428.	392.	368.	343.
322.	301.	275.	248.	235.	219.	209.	192.	179.	168.
157.	150.	145.	140.						

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	2.	3.	3.	4.	4.	4.	3.	3.
3.	3.	3.	3.	4.	4.	5.	5.	6.	6.
5.	5.	5.	4.	4.	4.	3.	3.	3.	3.
3.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.						

STAGE

257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0
257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.0	257.1
257.1	257.2	257.3	257.5	257.7	258.0	258.3	258.6	258.8	258.9
259.0	259.1	259.2	259.3	259.4	259.4	259.5	259.5	259.5	259.6
259.6	259.6	259.6	259.7	259.7	259.8	259.9	260.2	260.6	261.3
262.0	263.0	266.1	267.0	267.5	267.7	267.8	268.0	268.0	268.7
267.0	267.0	267.3	267.4	267.8	268.3	263.1	269.7	270.0	269.9
269.9	269.6	269.2	268.7	268.2	267.8	267.4	267.0	266.7	266.4
266.1	265.8	265.4	264.8	264.3	263.7	263.1	262.5	262.3	261.5
261.1	260.8	260.5	260.3	260.1	259.9	259.8	259.7	259.6	259.5
259.4	259.3	259.2	259.1	259.0	258.9	258.9	258.8	258.8	258.7
258.6	258.5	258.5	258.4						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	18660.	6258.	1718.	1718.	247459.
CMS	382.	177.	49.	49.	7007.
INCHES		28.79	22.84	22.84	22.84
MM		528.11	580.05	580.05	580.05
AC-FT		3183.	3489.	3489.	3489.
THOUS CU M		3928.	4284.	4284.	4284.

MAXIMUM STORAGE = 6.

MAXIMUM STAGE IS 270.0

D-38

HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.30	1	1	C	0		0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	FLNVT	ELMAX	PLNTH	SEL
.0450	.0450	.0490	290.0	280.0	2250.	.00400

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 243.00 1000.00 260.00 1150.00 253.00 1150.00 250.00 1175.00 250.00
1175.00 253.00 1900.00 260.00 1400.00 280.00

STORAGE	0.00	2.04	4.10	9.18	19.31	34.50	54.75	80.80	115.03	157.64
	208.61	267.95	335.67	411.79	496.21	589.03	690.23	799.79	917.73	1044.03
OUTFLOW	0.00	103.94	303.90	718.06	1611.79	3208.02	5692.95	9014.95	13746.53	20255.06
	28773.64	39534.49	52761.01	68671.13	87469.97	109358.67	134531.24	163176.02	195476.32	231610.85
STAGE	250.00	251.34	253.16	254.74	256.32	257.89	259.47	261.05	262.63	264.21
	265.79	267.37	268.95	270.53	272.11	273.68	275.26	276.84	278.42	280.00
FLOW	0.00	103.94	304.90	719.06	1611.79	3208.02	5692.95	9014.95	13746.53	20255.06
	28773.64	39534.49	52761.01	68671.13	87469.97	109358.67	134531.24	163176.02	195476.32	231610.85

STATION 5, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	3.
5.	10.	18.	30.	45.	65.	84.	119.	150.	140.
216.	241.	265.	285.	304.	318.	331.	343.	353.	361.
368.	374.	379.	384.	391.	404.	420.	469.	529.	603.
929.	1577.	3129.	4931.	5916.	6449.	6732.	6954.	6330.	5483.
9526.	9769.	9875.	9119.	8524.	7106.	8160.	9651.	10355.	10355.
10426.	10142.	9533.	8756.	7945.	7198.	6541.	5995.	5574.	5195.
4822.	4434.	4087.	3538.	3063.	2616.	2176.	1782.	1484.	1204.
991.	822.	698.	598.	533.	486.	449.	419.	391.	366.
342.	320.	295.	268.	247.	231.	215.	202.	189.	176.
165.	156.	149.	144.						

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	2.	2.	3.	3.
3.	3.	4.	4.	4.	4.	4.	5.	5.	5.
5.	5.	5.	5.	5.	5.	6.	6.	7.	6.
12.	19.	34.	49.	57.	61.	63.	65.	68.	53.
51.	55.	56.	58.	61.	66.	74.	84.	91.	92.
91.	89.	85.	79.	72.	67.	61.	57.	54.	51.
64.	44.	41.	37.	33.	29.	25.	21.	18.	15.
12.	10.	9.	8.	7.	6.	6.	5.	5.	5.
5.	4.	4.	4.	3.	3.	3.	3.	3.	3.
3.	3.	2.	2.						

STAGE

250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
250.1	250.2	250.3	250.5	250.7	251.0	251.3	251.7	252.0	252.2
252.4	252.6	252.8	253.0	253.1	253.2	253.2	253.3	253.3	253.4
253.4	253.4	253.4	253.4	253.5	253.5	253.6	253.6	254.0	254.5
255.1	256.3	257.0	259.0	259.6	259.8	260.0	260.1	255.0	259.3
259.4	259.5	259.6	259.7	259.9	260.2	260.6	261.2	261.5	261.6
261.5	261.4	261.2	260.9	260.5	260.2	259.9	259.6	259.4	259.2
258.9	258.7	258.4	258.1	257.8	257.3	256.9	256.5	256.1	255.6
255.2	254.9	254.6	254.3	254.0	253.8	253.7	253.6	253.5	253.4
253.3	253.2	253.1	252.8	252.7	252.6	252.4	252.3	252.2	252.1
252.1	252.0	251.9	251.9						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	18559.	6252.	1717.	1717.	247282.
CMS	899.	177.	49.	49.	7002.
INCHES		21.77	22.82	22.82	22.82
MM		527.58	579.64	579.64	579.64
AC-FT		3108.	3406.	3406.	3406.
THOUS CU M		3824.	4201.	4201.	4201.

MAXIMUM STORAGE = 92.

MAXIMUM STAGE IS 261.6

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .15	RATIO 2 .25	RATIO 3 .56	RATIO 4 1.88
HYDROGRAPH AT	1	2.88	1	1581.	2635.	5271.	10542.
	(	7.25)	(	44.76)(	74.63)(	149.26)(	298.52)(
ROUTED TO	2	2.88	1	2616.	3960.	6574.	10888.
	(	7.25)	(	73.91)(	112.71)(	186.17)(	306.84)(
ROUTED TO	3	2.88	1	4530.	5904.	6542.	10633.
	(	7.25)	(	128.58)(	167.18)(	185.25)(	301.09)(
ROUTED TO	4	2.88	1	4612.	5898.	6520.	10668.
	(	7.25)	(	127.77)(	165.87)(	184.67)(	301.86)(
ROUTED TO	5	2.88	1	4485.	5836.	6489.	10555.
	(	7.25)	(	127.01)(	165.27)(	183.49)(	298.88)(

BREACH ANALYSIS

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	288.38	288.38	294.38
STORAGE	238.	338.	482.
OUTFLOW	0.	0.	1848.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.15	294.59	.29	488.	2618.	.39	17.00	16.58
.25	294.46	.16	435.	4013.	.33	16.72	15.67
.50	294.50	.20	437.	6574.	.39	16.67	14.68
1.00	294.91	.61	413.	18888.	.96	16.33	13.33

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	268.20	268.20	272.20
STORAGE	85.	85.	147.
OUTFLOW	0.	0.	1468.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.15	272.57	.37	154.	4542.	.38	17.31	16.83
.25	272.64	.44	155.	5984.	.42	16.83	16.88
.50	272.62	.42	155.	6542.	.48	16.67	14.34
1.00	273.15	.95	164.	18633.	.48	16.50	13.67

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.15	4512.	266.1	17.50
.25	5858.	267.1	16.83
.50	6520.	267.6	16.67
1.00	18660.	270.8	16.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.15	4485.	258.7	17.50
.25	5836.	259.5	16.83
.50	6489.	259.8	16.83
1.00	18555.	261.6	16.67

SKYLINE LANE DAM #2

Dam Application No. 399
(23-73)

State of New Jersey

State Water Policy Commission

REPORT ON DAM APPLICATION

To the State Water Policy Commission,
State of New Jersey.

Gentlemen:

The application of Realty Acquisition Co., N.S. Winston, President, 22 W. 19th St., N.Y. filed June 26, 1945 for approval of plans and for a permit to construct a dam known as Skyline Lake (Dam #2) near Ramapo on Shepherd Brook tributary to Ramapo River in Passaic County New Jersey, has been examined by George R. Shanklin, Hydraulic Engineer.

PRINCIPAL FEATURES

Location 31.71.2.0.1		Site inspected 7/27/45 - G.R.S.	
Purpose of dam	Real Estate Development	Length of dam	230 feet
Drainage area	2.3 sq.mi.	Elevation of dam line	122.0 assumed datum
Area of Lake	65 acres	Capacity of lake	127 Mill gals.
Type of dam	Earth fill. Steel sheet piling core wall.	Top width	8 feet
Upstream slope	2 to 1	Downstream slope	2 to 1
Foundation material	Sand & gravel with blue clay	Max. height	22.0 feet
Type of spillway	Concrete wall with spillway channel below	Length of spillway	50 feet
Max. elevation spillway	4.0 feet for 1.0 ft. free-board below top of core wall		
Spillway capacity	755 cu. ft.	756	cu. ft per sq. mi.
Estimated maximum flood flow	400	cu. ft per sq. mi.	1935 Central Jersey Curve
Outlets other than spillway	24-inch blowoff pipe to right of spillway		
Drawings filed	July 31, 1945 by Powell T. Harrison, Engineer, Butler, N. J.		

It has been found that the site for the dam is suitable and the plans adequate to ensure the construction of a structure which will not be a menace to life or property. It is therefore recommended that the plans be approved and that a permit be issued, subject, however, to the following conditions:

1. That the permittee shall not take any property rights either by condemnation, purchase, agreement, or otherwise, or impair any private property rights by reason of private rights, nor any infringement of Federal, State or local laws or regulations, nor shall it waive the obtaining of Federal assent, when necessary.

D-42

Skyline Lake Dam No. 2

RECEIVED

JUN 29 1945

STATE WATER POLICY COMMISSION

STATE OF NEW JERSEY
STATE WATER POLICY COMMISSION

28 WEST STATE STREET

TRENTON, NEW JERSEY

DAM APPLICATION No. 399

APPLICATION FOR PERMIT FOR CONSTRUCTION (23-73) OR REPAIR OF DAM

Section 23.31.2.9.4 ☐

Butler, Morris Co., N.J., New Jersey

June 21, 1945 19.....

To the New Jersey State Water Policy Commission,

Gentlemen:—

In compliance with the provisions of Title 58, Chapter 4, Revised Statutes

Realty Acquisition Co. 22 East 48th. St. New York, N.Y. H.K. Einsten, Pres.

(Here insert name and address of public authority, private person or corporation which will be the owner of the dam)

hereby makes application for the approval of drawings and for the issuance of a permit to construct (~~repair~~) a dam known as Skyline Lake (Dam #2)

(Here insert name of dam)

across Shephard Brook in Passaic County, New Jersey,

(Here insert name of stream)

at a point ½ mile upstream from Dam #1

(Here give location by distance from mouth of stream, county or municipal boundary or other geodetical feature)

for the purpose of Real Estate Development

(Here state the purpose of the proposed lake)

in accordance with the following information and with the complete specifications and drawings filed with this application and made part hereof, as follows:

Area of water shed..... 2.6 square miles.

Maximum depth of lake..... approximately 20 feet

Area of water surface..... 65 acres

Capacity of spillway at 2½ feet head, is 67± cubic feet per second.

The character of the foundation material is sand, gravel, clay and hardpan.

.....

.....

.....

As determined by Kent Holes

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SKYLINE LAKE DAM No. 2

2. That the work shall at all times be subject to supervision and inspection by representatives of the State Water Policy Commission and that no changes in plans and specifications as approved shall be made except with written consent of the Commission. The Commission however, reserves the right to require such changes or modifications in the plans and specifications as may be considered necessary, and further reserves the right to suspend or revoke this permit at any time should such action be deemed advisable in the interest of public safety.

3. That the work shall be under the direction of a competent engineer, and that he or a competent representative shall be on the ground daily during the construction and until the completion of the dam.

4. That the Commission shall be notified in advance of the proposed time of the commencement of this work; that no material shall be placed on any portion of the foundation until such portion of the foundation has been approved in writing by a representative of the Commission.

5. That a report, on forms to be submitted by the Commission, on the status of the construction work shall be mailed to the State Water Policy Commission, 28 West State Street, Trenton, New Jersey, on the first day of each month until the work upon the dam has been completed.

6. That no brush or waste timber cleared from the area under this approval shall be burned unless and until the party doing the work shall have obtained a permit from the Firewarden of the district in which the burning is to be done, in accordance with Title 13:9-19 of the Revised Statutes.

7. That no flashboards or other obstruction shall be placed or permitted to remain on the crest of the spillway.

8. That the work shall be started within one year from date of this permit and completed within two years from said date; otherwise, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

9. This permit shall not become operative unless and until the applicant shall file with the Commission within thirty days from date hereof, upon a form furnished by the Commission, its written acceptance of the terms and conditions hereby imposed.

10. Drawings hereby approved are sheets Nos. 2, 4 and 5, Dam 2, together with title sheet entitled "Plan and Profile for Construction of Dams at Skyline Lake, Borough of Elmwood, Passaic County, July 10, 1945".

No Rule "B" Acknowledgment Issued.

George B. Gribbin

Hydraulic ~~Assistant Director~~ Engineer.

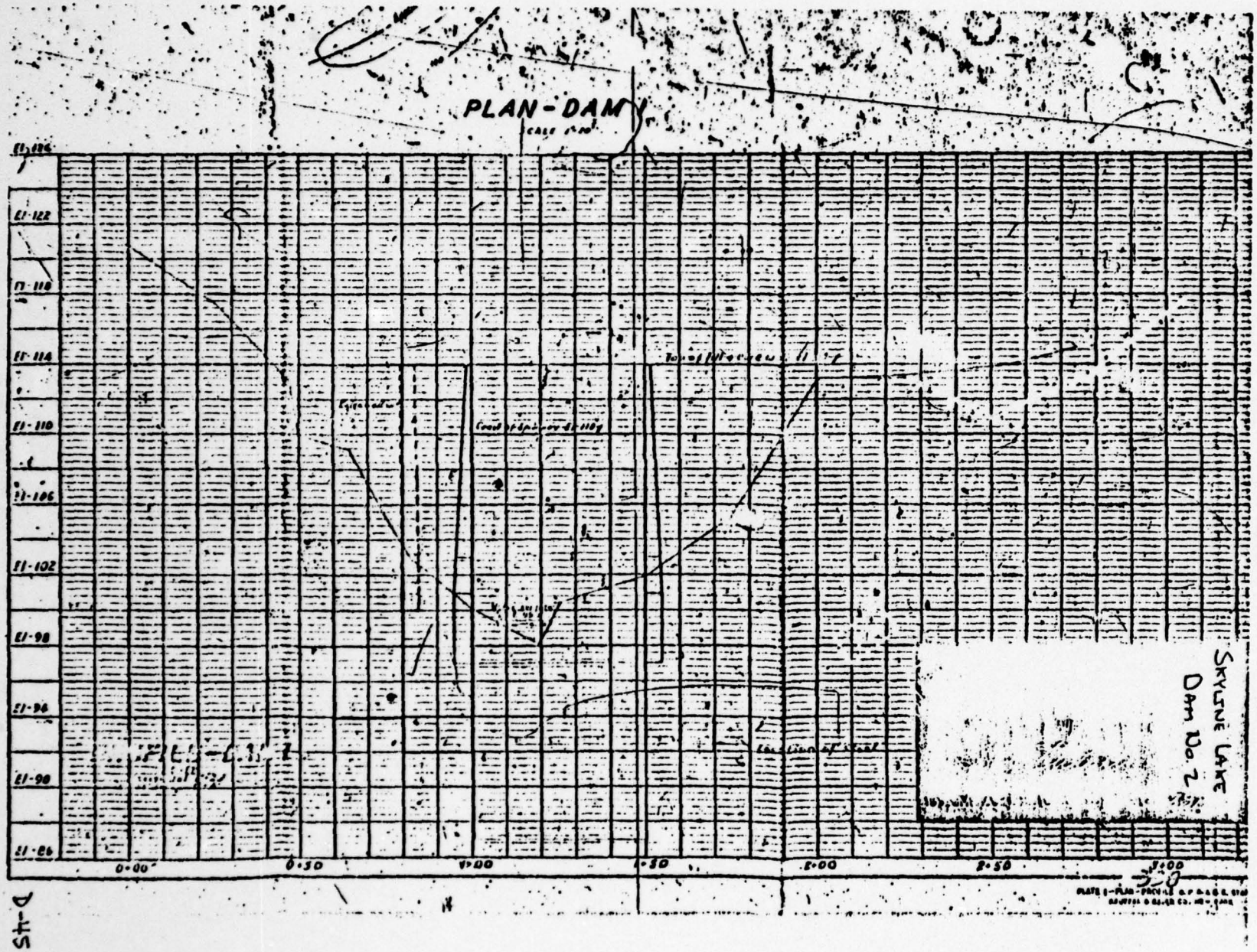
W. P. Richards

~~Assistant Director~~
Chief Engineer

Trenton New Jersey,

July 21 1945

D-44


PLAN-DAM
El-122
El-118
El-114
El-110
El-106
El-102
El-98
El-94
El-90
El-86
0+00
0+50
1+00
1+50
2+00
2+50
3+00
Skyline Lake
Dam No. 2

D-45

Form 15 60-12-39

SKYLINE LAKE DAM No. 1

Dam Application No. 393
(23-72)

State of New Jersey
State Water Policy Commission

REPORT ON DAM APPLICATION

To the State Water Policy Commission,
State of New Jersey.

Gentlemen:

The application of Realty Acquisition Company, H. K. Winston, President, 22 West 48th Street, New York City
filed June 29, 1945 for approval of plans and for a permit to construct a dam
known as Skyline Lake (Dam #1) near Wanaque on Shephard Brook
tributary to Wanaque River in Passaic County, New Jersey.
has been examined by George R. Shanklin, Hydraulic ~~Assistant Division~~ Engineer.

PRINCIPAL FEATURES

Location 23.31.3.3.1		Site inspected 7/27/45 - G.R.S.	
Purpose of dam Real Estate Development		Length of dam 160	feet
Drainage area 2.9	sq. mi.	Elevation of flow line 110.0 assumed datum	
Area of Lake 45±	acres	Capacity of lake 45±	Mill. gals.
Type of dam Earth fill. Steel sheet piling core wall.		Top width 8	feet
Upstream slope 2 to 1		Downstream slope 2 to 1	
Foundation material Sand & gravel with blue clay		Max. height 16.0	feet
Type of spillway Concrete Cree overflow		Length of spillway 50	feet
Max. head on spillway 3.0	feet for 1.0' free-board below top of dam and core wall		
Spillway capacity 905	sec. ft.— 312	sec. ft. per sq. mi.	
Estimated maximum flood flow 295		sec. ft. per sq. mi. (1"5% Central Jersey Curv.	

Outlets other than spillway 20-inch blowoff pipe to left of spillway

Drawings filed July 31, 1945 by Newell C. Harrison, Engineer, Butler, N. J.

It has been found that the site for the dam is suitable and the plans adequate to ensure the construction of a structure which will not be a menace to life or property. It is therefore recommended that the plans be approved and that a permit be issued, subject, however, to the following terms and conditions:—

1. That this permit does not give any property rights, either in real estate or material, nor any exclusive privileges; neither does it authorize any injury to private property nor invasion of private rights, nor any infringement of Federal, State or local laws or regulations, nor does it waive the obtaining of Federal assent, when necessary.

D-46

Form C-[illegible]

SKYLINE LAKE DAM No

RECEIVED

JUN 29 1945

STATE WATER POLICY COMMISSION

STATE OF NEW JERSEY

STATE WATER POLICY COMMISSION

28 WEST STATE STREET

TRENTON, NEW JERSEY

STATE WATER POLICY COMMISSION

DAM APPLICATION No. 398

APPLICATION FOR PERMIT FOR CONSTRUCTION (23-72) OR REPAIR OF DAM

Butler, Morris Co. New Jersey

location 23.31.5.3.1

June 27, 1945

To the New Jersey State Water Policy Commission.

Gentlemen:—

In compliance with the provisions of Title 58, Chapter 4, Revised Statutes

Realty Acquisition Co. 22 West 48th. St. New York, N.Y. H. K. Winston, Pres.

(Here insert name and address of public authority, private person or corporation which will be the owner of the dam)

hereby makes application for the approval of drawings and for the issuance of a permit to construct [illegible] a dam known as Skyline Lake (Dam #1)

(Here insert name of dam)

across Shephard Brook in Passaic County, New Jersey.

(Here insert name of stream)

at a point approximately 2000 ft. northerly of boundary line of Ringwood & Paragus Boros.

(Here give location by distance from mouth of stream, county or municipal boundary or other points of reference)

for the purpose of Real Estate Development

(Here state the purpose of the proposed lake)

in accordance with the following information and with the complete specifications and drawings filed with this application and made part hereof, as follows:

Area of water shed ..... 2.8 ..... square miles

Maximum depth of lake ..... 12 ..... feet

Area of water surface ..... approximately 35 ..... acres

Capacity of spillway at 2½ feet head, is 625 cubic feet per second.

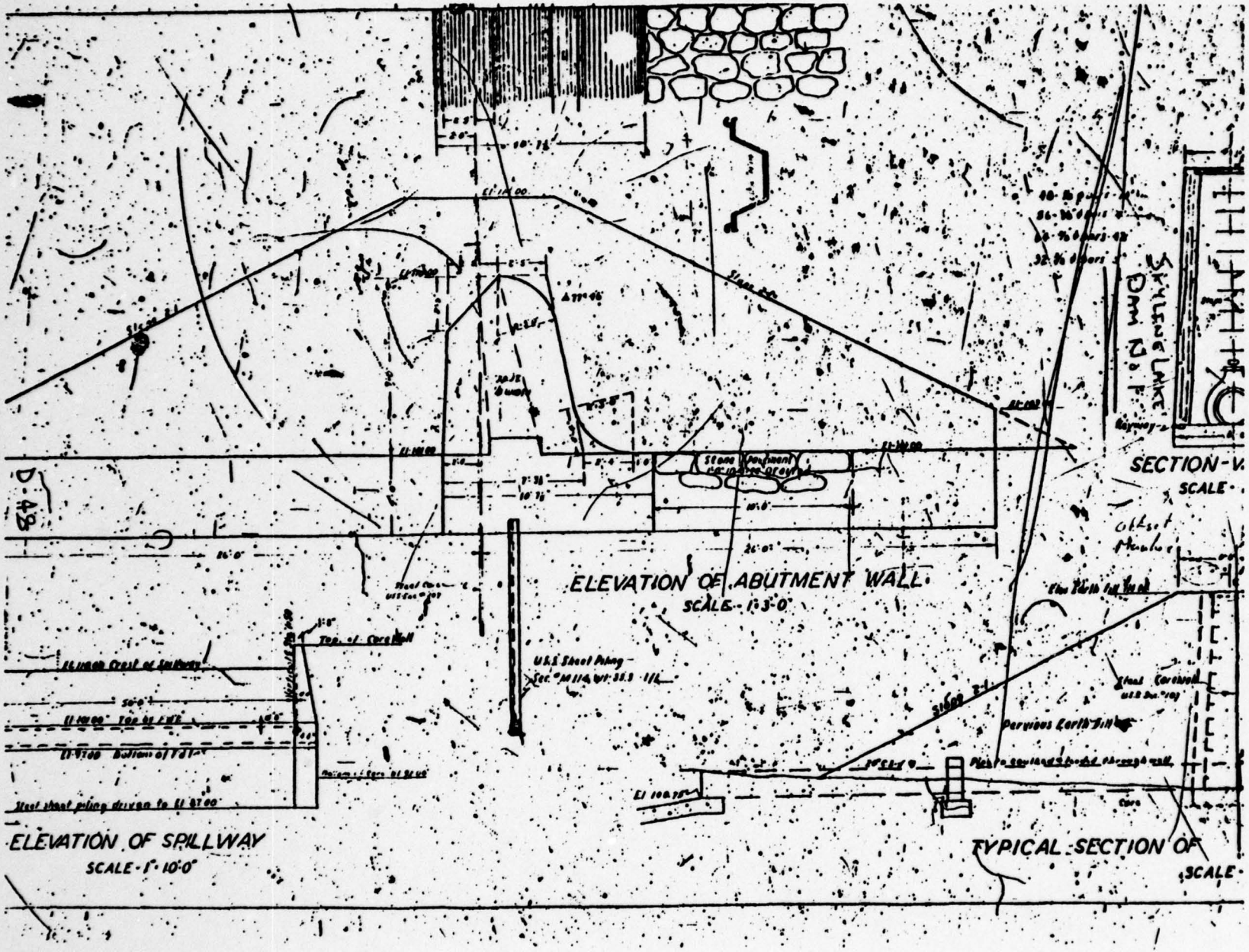
The character of the foundation material is sand, gravel, clay and hard-pan.

As determined by test holes.

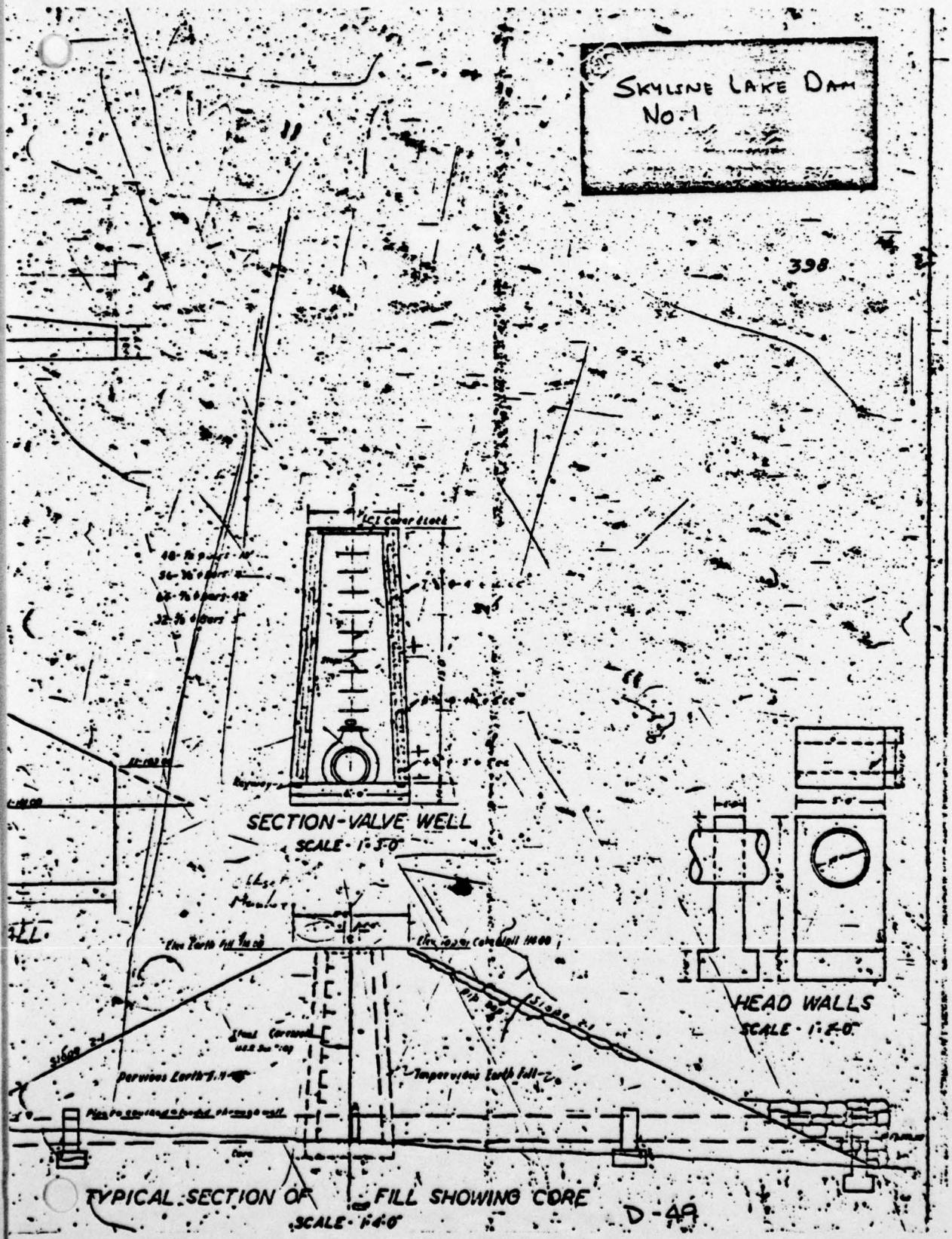
See App 399 for general correspondence & location map prior to filing of application

apps

D-47


ELEVATION OF ABUTMENT WALL
SCALE - 1" = 5'-0"
ELEVATION OF SPILLWAY
SCALE - 1" = 10'-0"
TYPICAL SECTION OF
SCALE -
SECTION-V
SCALE -
SKYLINE LAKE DAM NO. 1
D-48
Top of Core Wall
U.S.S. Sheet Piling
Sec. "M" 11A, Wt. 38.3 #/L.F.
Steel sheet piling driven to El 87.00
Pervious Earth Fill
Core

SKYLINE LAKE DAM
NO. 1



D-49

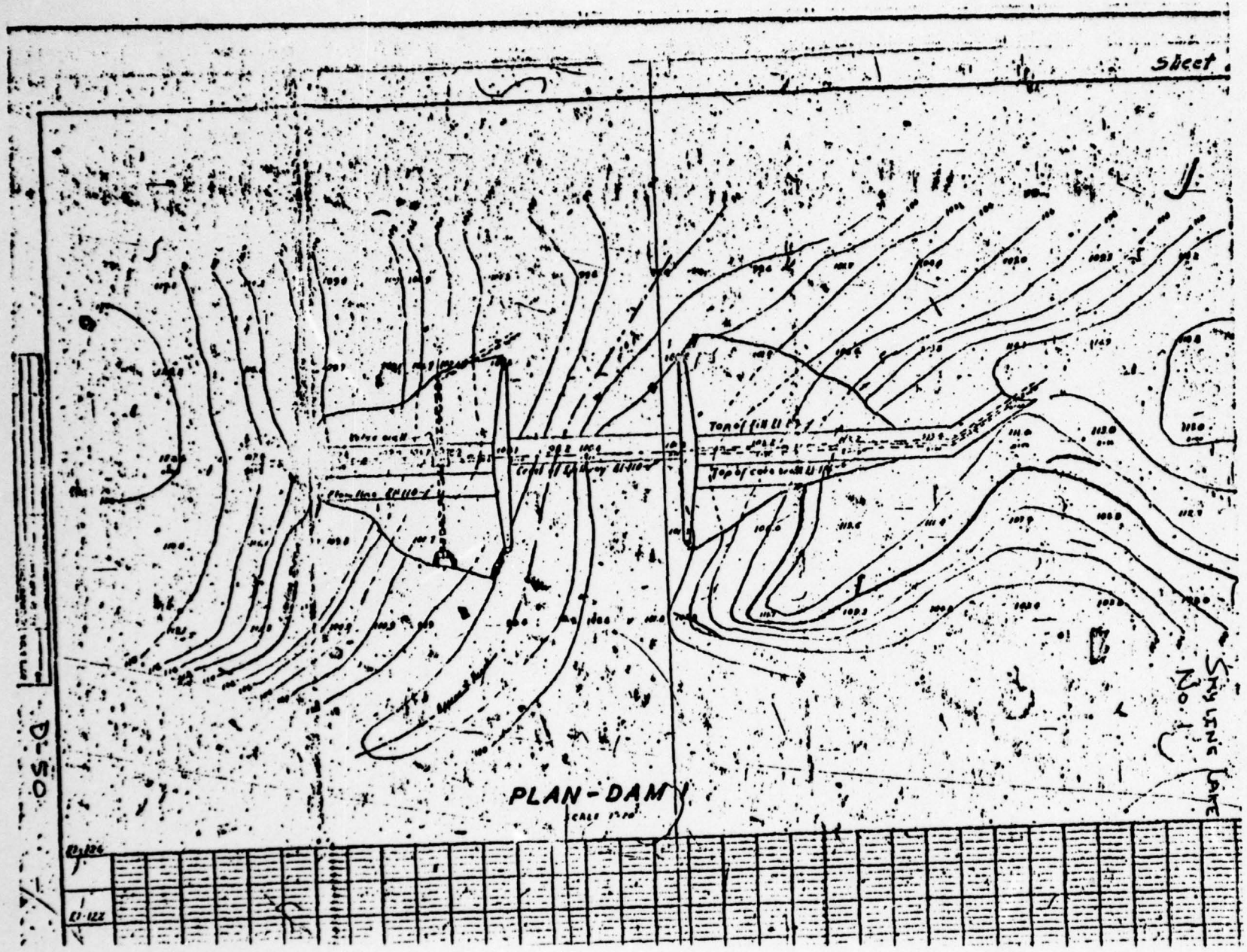
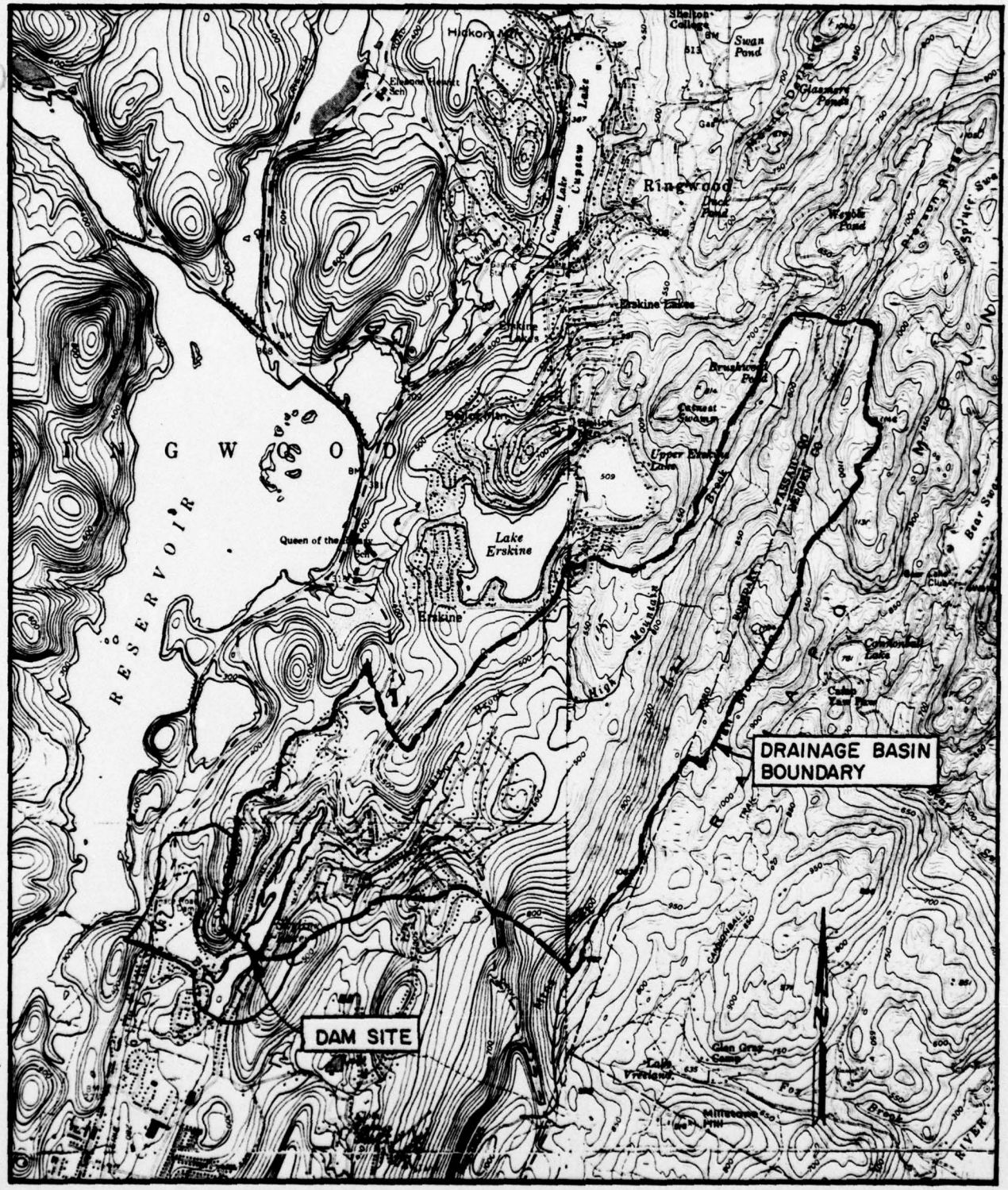

Sheet
PLAN - DAM
SAN LUIS LAKE
NO. 1

PLATE D-1



1000 0 1000 2000 3000 4000 5000 6000

SCALE IN FEET



AREA LOCATION

SKYLINE LAKE DAM NO. 2

JENNY-LEEDSHILL JANUARY 1979

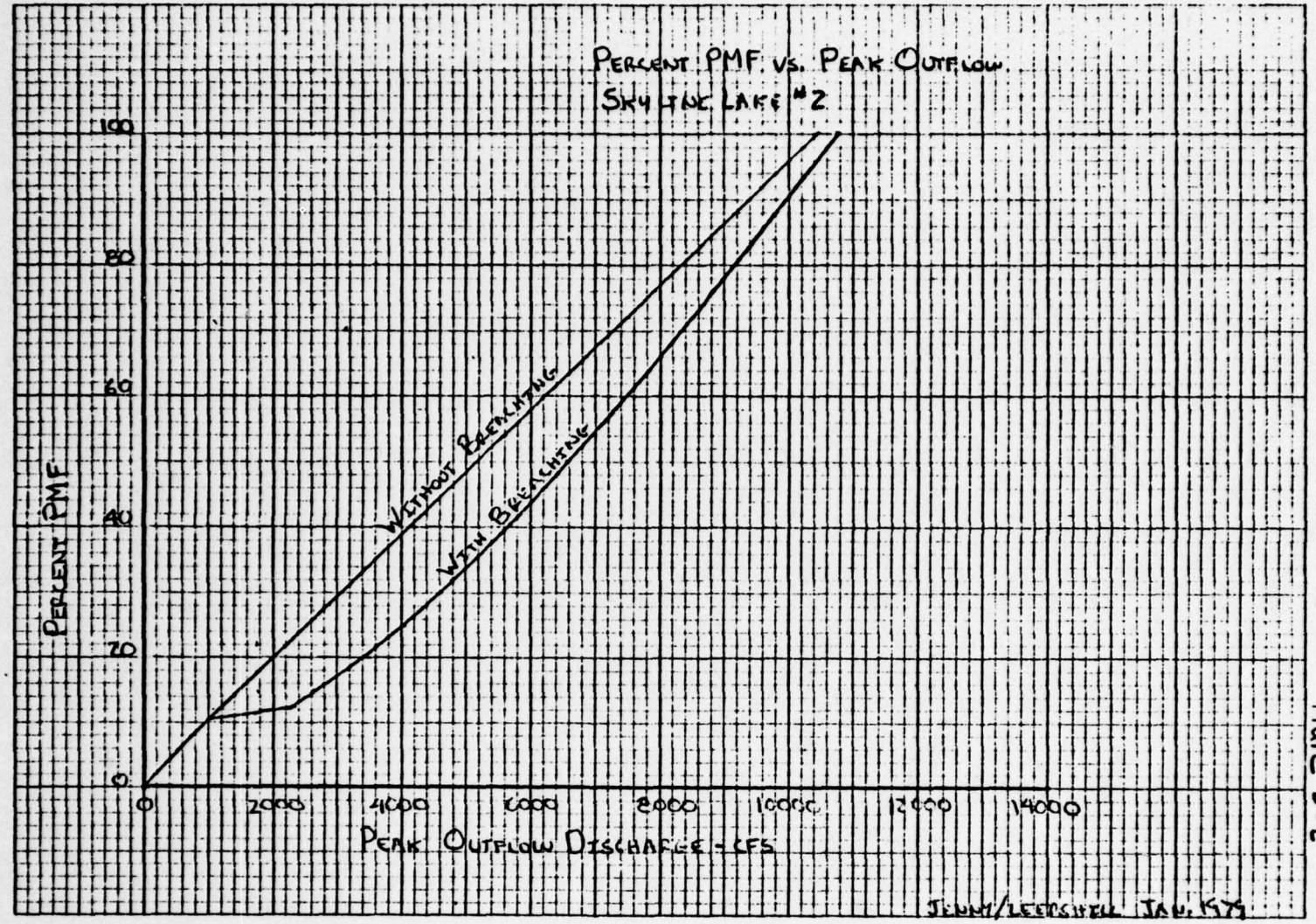

PERCENT PMF VS. PEAK OUTFLOW
SKY LAKE #2
PERCENT PMF
100
80
60
40
20
0
WITHOUT BREACHING
WITH BREACHING
0
2000
4000
6000
8000
10000
12000
14000
PEAK OUTFLOW DISCHARGE - CFS
JENNY/LEETSCHEU JAN. 1979

Plate D-2

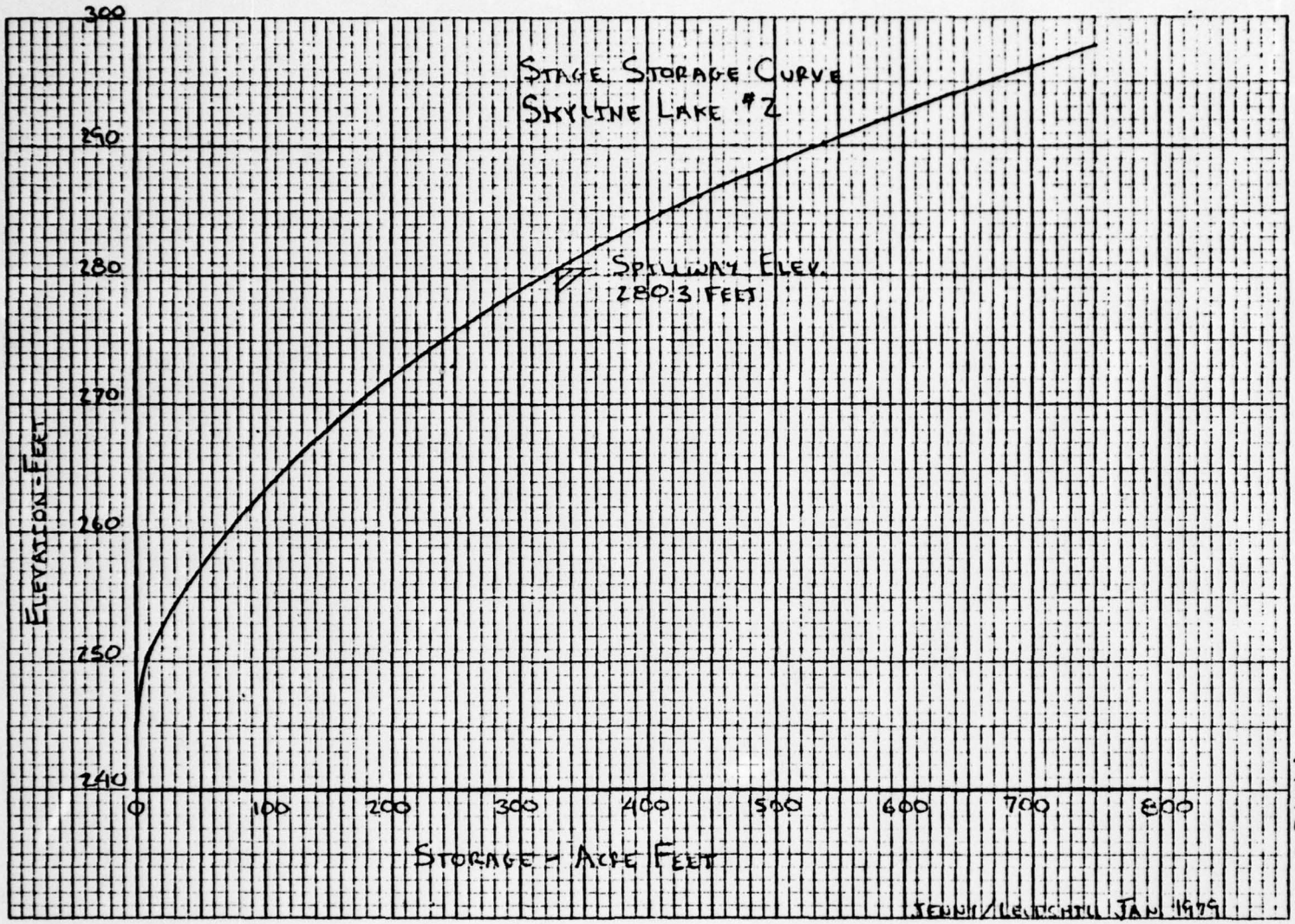

STAGE STORAGE CURVE
SKYLINE LAKE #4
SPILLWAY ELEV.
2803 FEET
ELEVATION-FEET
300
290
280
270
260
250
240
0
100
200
300
400
500
600
700
800
STORAGE - ACRE FEET
JENNI/LEITCHTU JAN 1979

Plate D-3

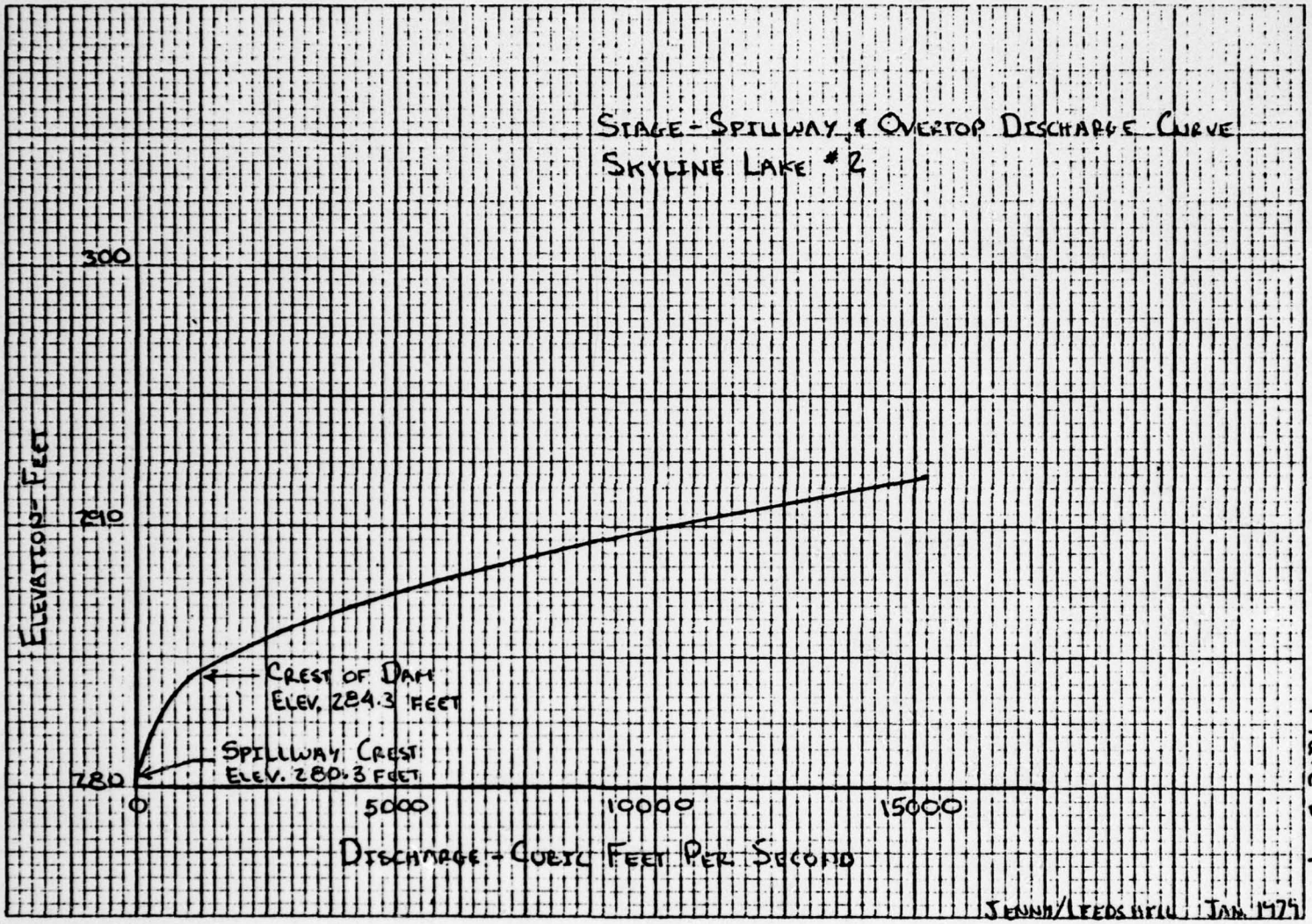

STAGE-SPILLWAY & OVERTOP DISCHARGE CURVE
SKYLINE LAKE #2
300
290
280
ELEVATION - FEET
CREST OF DAM
ELEV. 284.3 FEET
SPILLWAY CREST
ELEV. 280.3 FEET
0
5000
10000
15000
DISCHARGE - CUBIC FEET PER SECOND
JENNA/LEEDS HILL JAN. 1979

Plate D-4

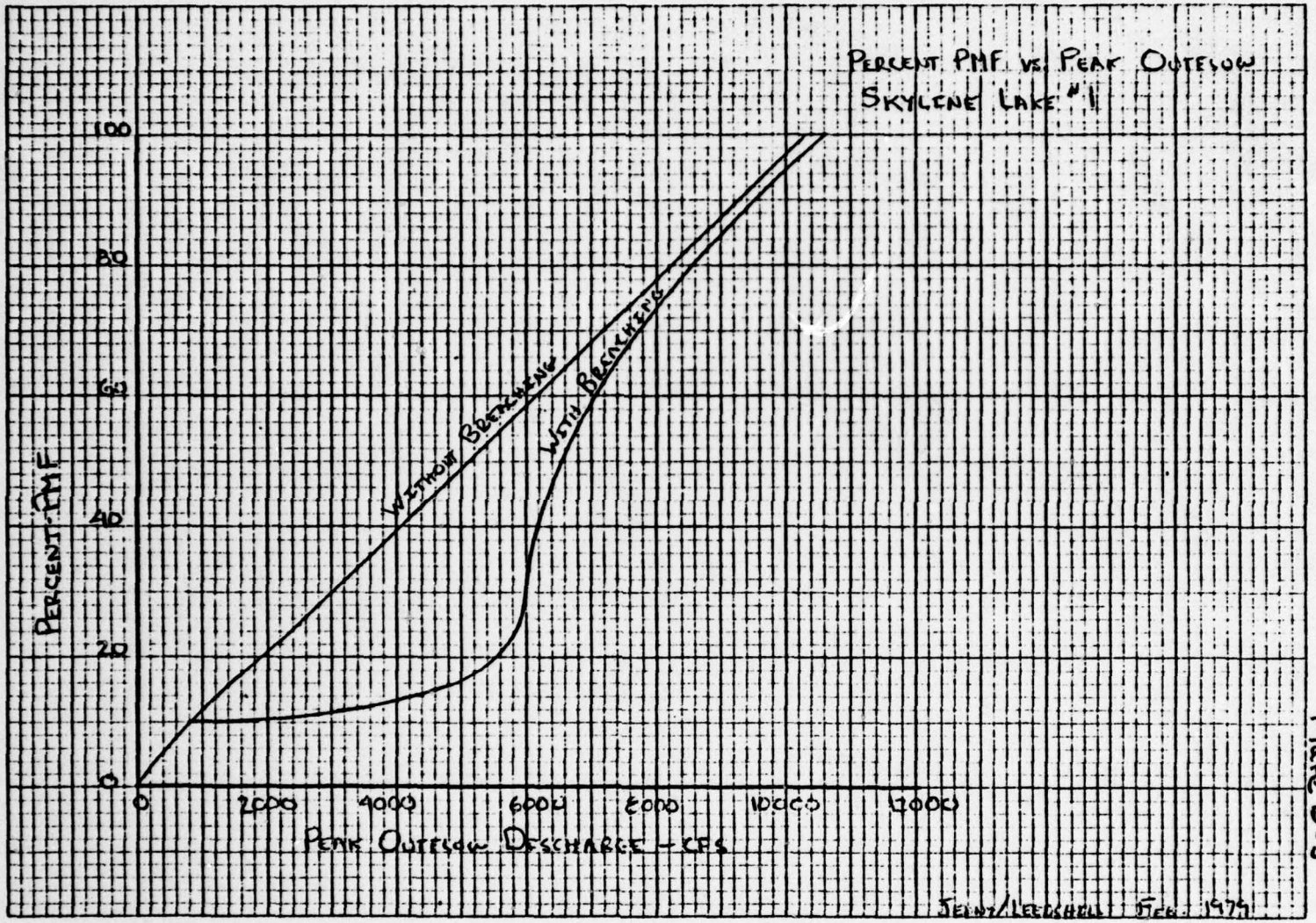

PERCENT PMF VS. PEAK OUTFLOW
SKYLENE LAKE #1
WITHOUT BREACHING
WITH BREACHERS
PERCENT PMF
100
80
60
40
20
0
0
2000
4000
6000
8000
10000
12000
PEAK OUTFLOW DISCHARGE - CFS
JENT/LEECHMAN DEC. 1979

Plate D-5

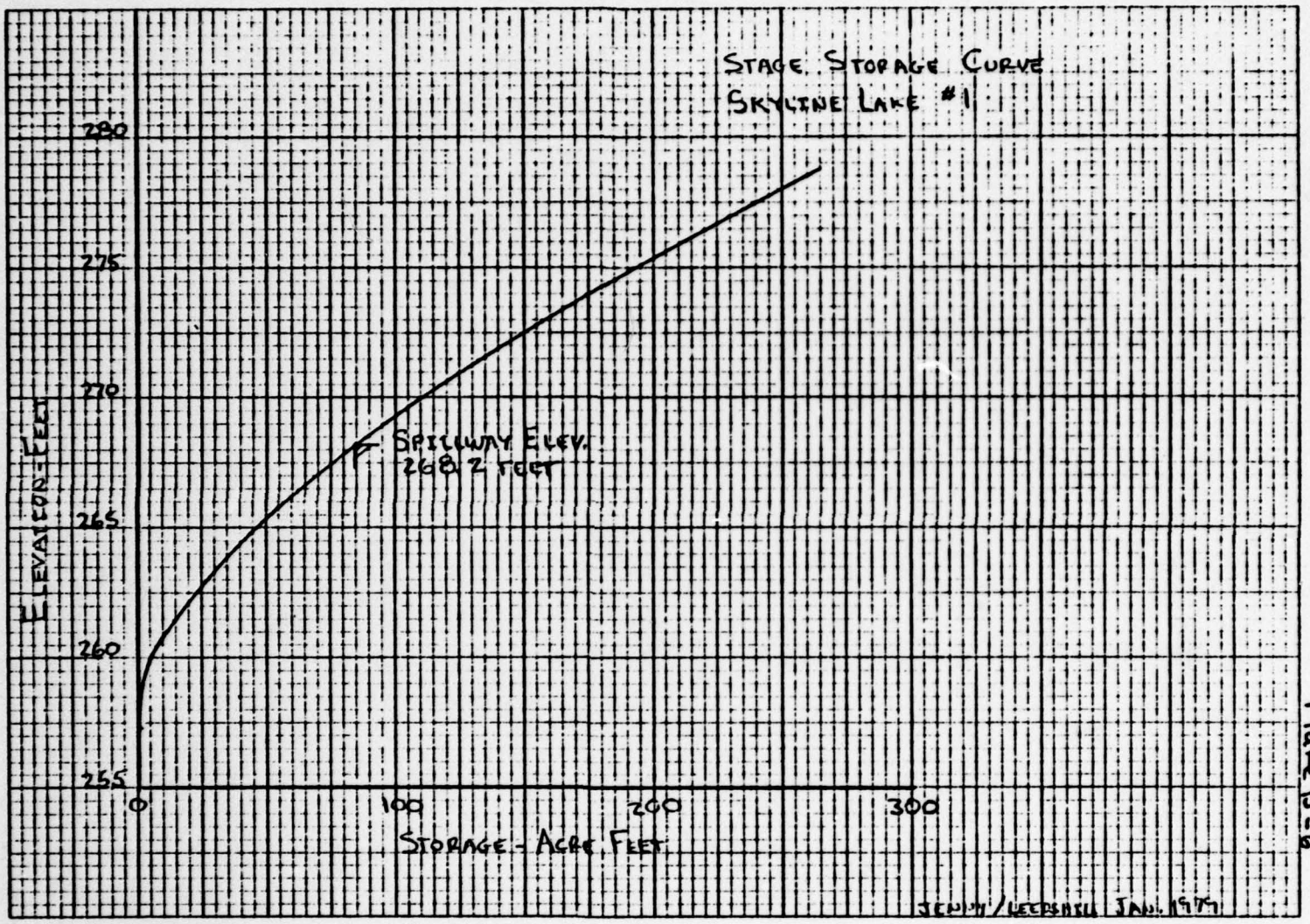

STAGE STORAGE CURVE
SKYLINE LAKE #1
280
275
270
265
260
255
ELEVATION-FEET
SPILLWAY ELEV.
2682 FEET
0
100
200
300
STORAGE - ACRE FEET
JENNY/LEECRAFT JAN. 1979

Plate D-6

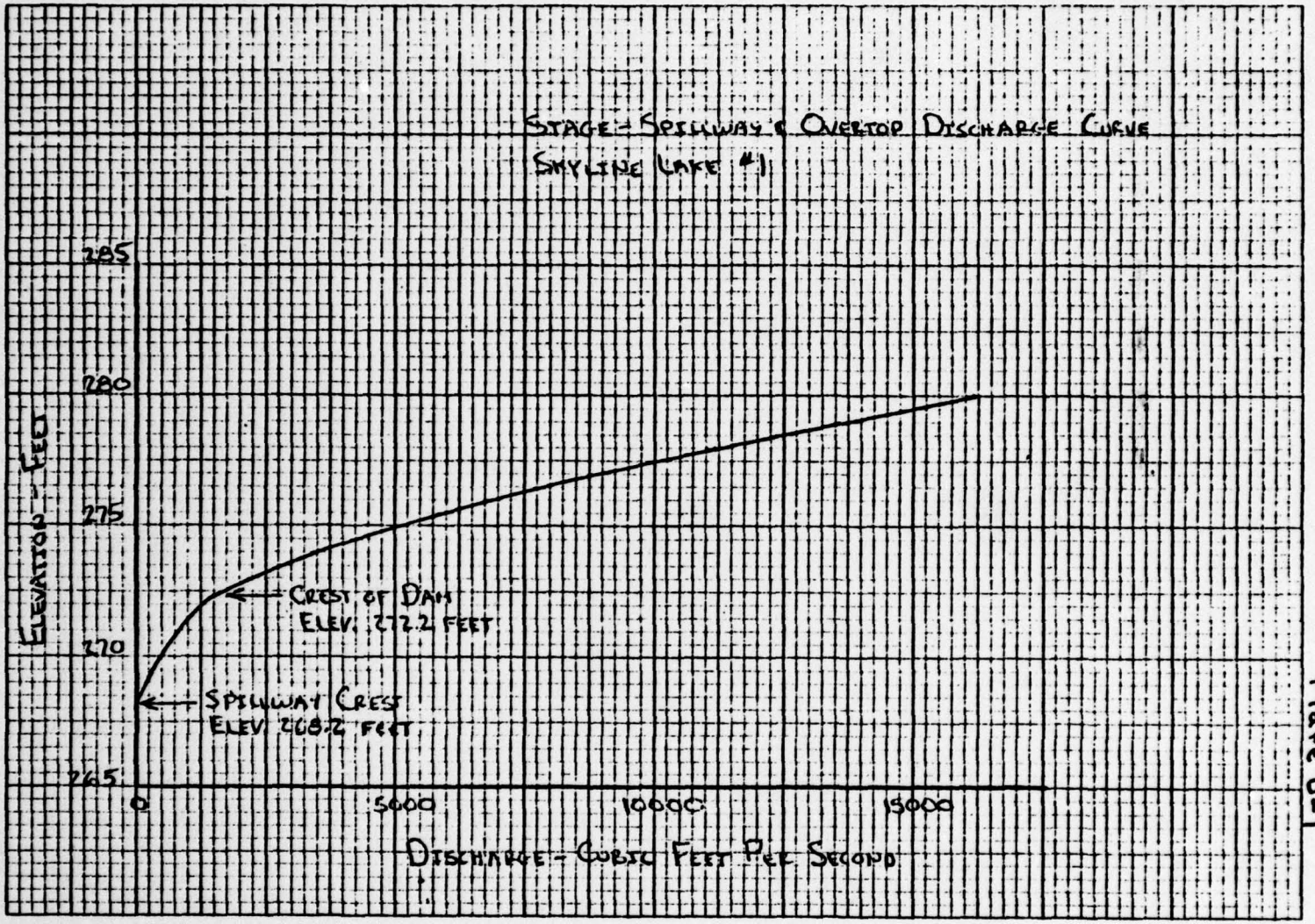

STAGE - SPILLWAY & OVERTOP DISCHARGE CURVE
SKYLINE LAKE #1
ELEVATION - FEET
285
280
275
270
265
CREST OF DAM
ELEV. 272.2 FEET
SPILLWAY CREST
ELEV 268.2 FEET
0
5000
10000
15000
DISCHARGE - CUBIC FEET PER SECOND

Plate D-7